PLRF-15C TRAINING

This Brief is Classified UNCLASSIFIED//FOR OFFICIAL USE ONLY

Pocket Laser Range Finder 15C

- Enabling Learning Objectives
- Terminal Learning Objectives
- What is the PLRF-15C
- How to use the PLRF-15C
- How to employ the PLRF-15C
- Care and cleaning of the PLRF-15C

Pocket Laser Range Finder 15C

Enabling Learning Objectives:

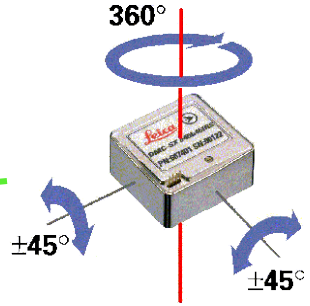
Upon completion of this period of instruction the Warfighter will be familiar with the following:

A. Specifications
B. Basic functions
C. Manipulation of the PLRF15C
D. Manipulation of the Menu Options
E. Maintenance, Care and Cleaning

Terminal Learning Objective:

Upon completion of this period of instruction, you the Warfighter, will have a better understanding on how to operate PLRF-15C.

Components of the PLRF-15C

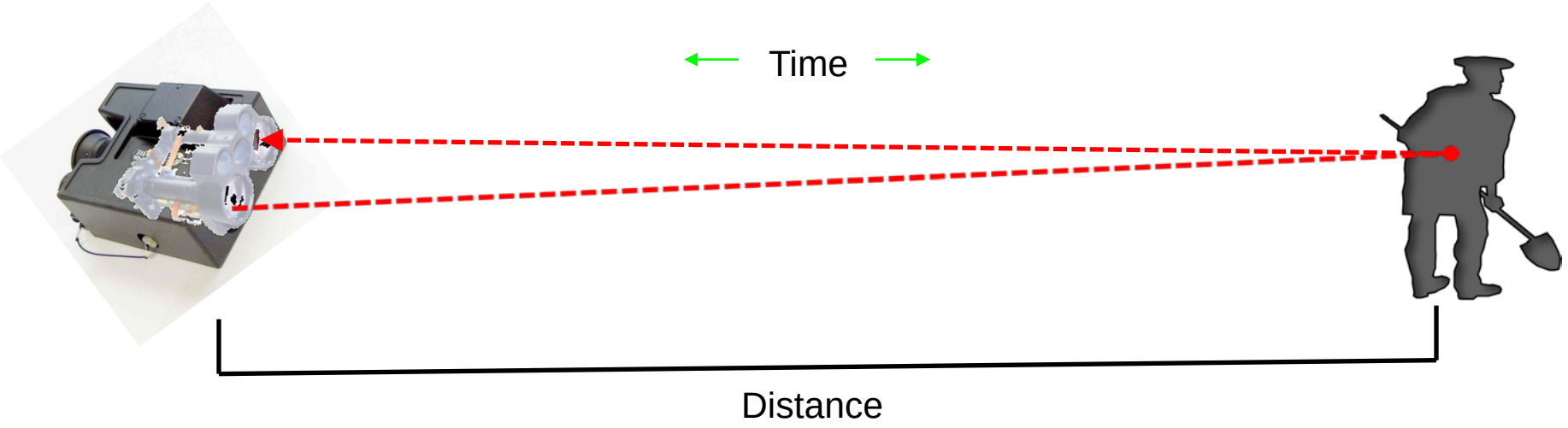


Digital Magnetic Compass / Inclinometer

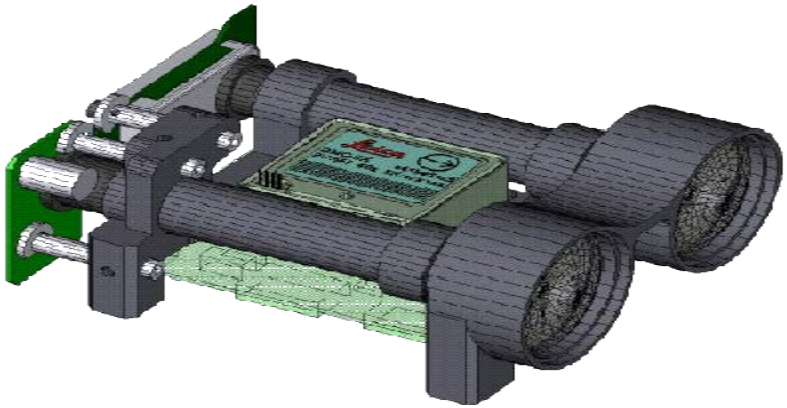
Laser Range Finder

What is a Laser Range Finder (LRF)?

- The LRF determines range to a target by firing multiple pulses of laser diode energy in a short period that reflect off of the target and return to the LRF receiver.
- The elapsed time is measured and the distance to the target is determined.
- Measurements are used to determine the distance value to the target.



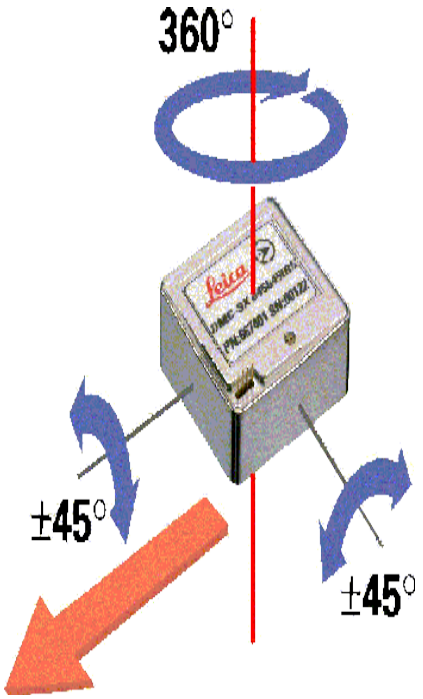
PLRF-15C Laser Range Finder



Two separate channels are used to optimize transmission and reception:

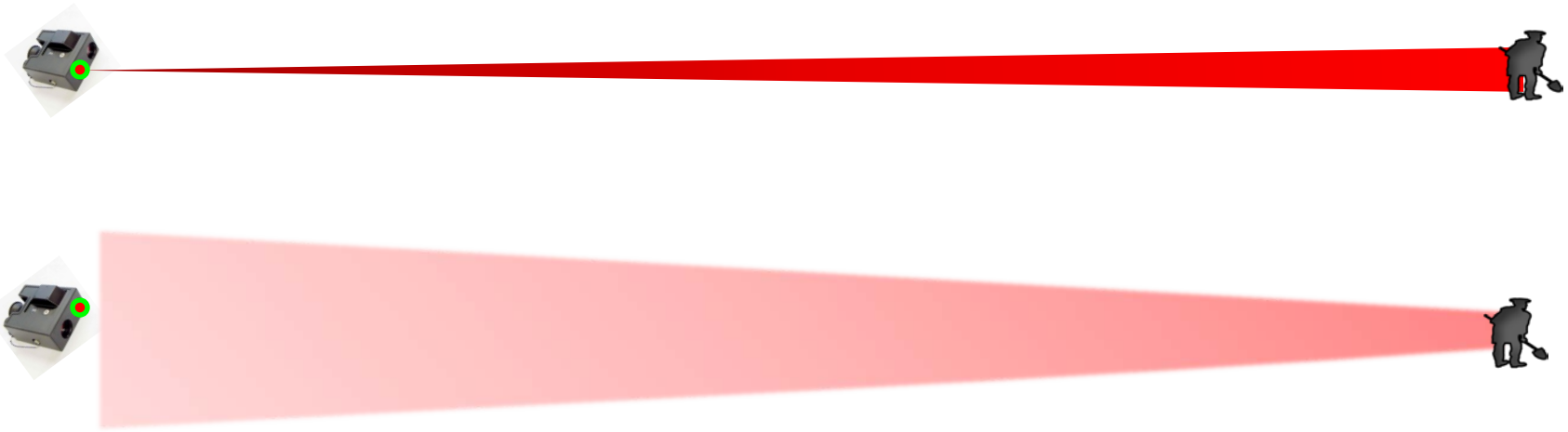
- The transmission source composed of an optic coupled with a stack of diodes transmitting at a wavelength of 1.54 µm.
- The receiver comprises an optic coupled with a reception diode (avalanche diode) optimized for detection of the return signal.
- The proximity of wavelengths of the IR imager and range finder assures maximum consistency in most operational conditions (weather conditions) between observation range and laser range.
- Electronic circuitry provides timing and calculation of the laser range finder (LRF) and management of the digital magnetic compass (DMC).
- The LRF module is eye safe, Class 1, EN 60825-1.

North Seeking Module



- The north seeking module was developed by VECTRONIX for the VECTOR and VIPER™ binocular systems, laser range finders as well as the PLRF-15C.
- The module in the PLRF-15C is identical in all VECTRONIX equipment.
- This north seeking module is a Digital Magnetic Compass (flux gate) that continuously measures the earth's magnetic field and provides the operator with the current line of sight position relative to magnetic north.
- This module has been integrated into the PLRF-15C.
- Calibration in the field enables consistently accurate measurements.

LRF Beam Divergence



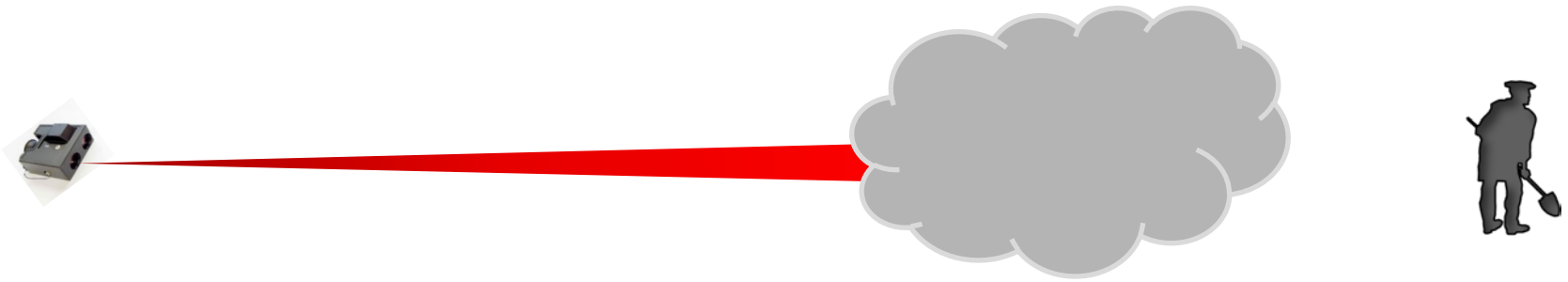
Distance Measurement - Basics

- ***The accuracy of the PLRF-15C depends upon:***

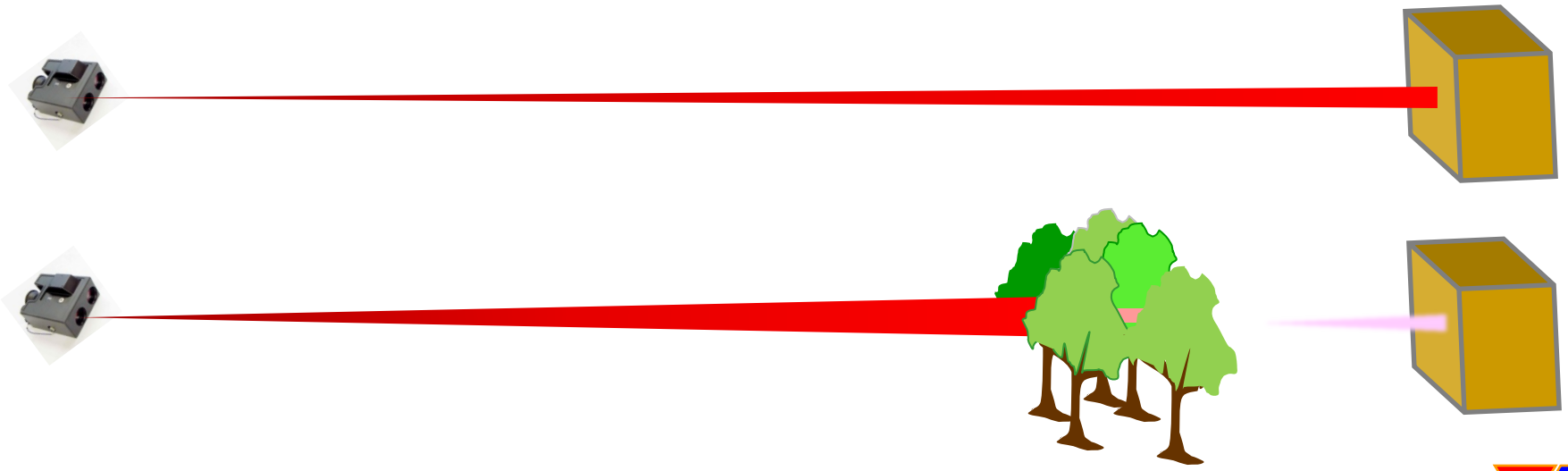
- Target characteristics (what its made of)
- Size (height, length, width)
- Albedo (target reflectivity)
- Atmospheric conditions (clouds, fog, smoke)
- Visibility (how far you can see)
- Steadiness (how still you hold it on target)

Factors Affecting Measurements

Atmospheric conditions:

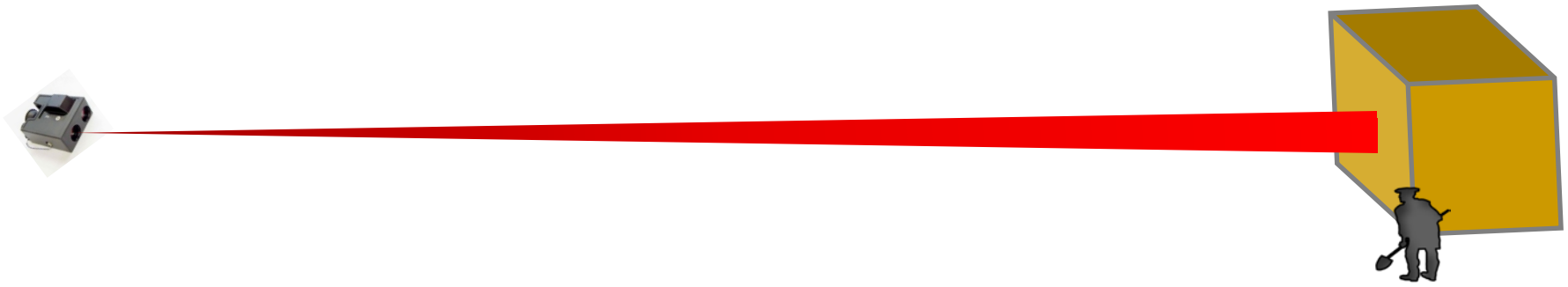


Target reflectivity:

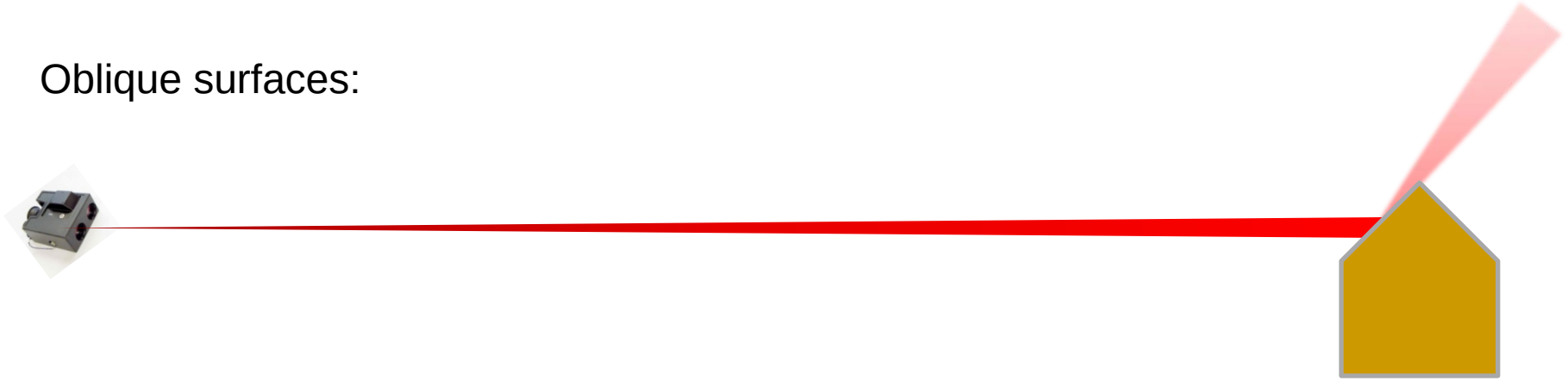


Factors Affecting Measurements

Target size:



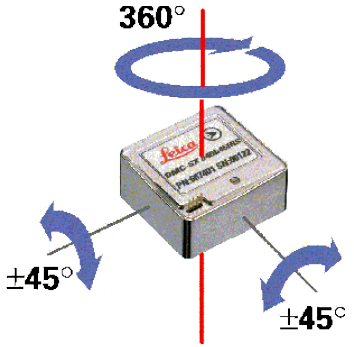
Oblique surfaces:



PLRF-15C Statistics

Laser Range Finder:

Waveband	1.54 microns (µm)
Safety	Class 1 eye-safe EN 60825-1
Laser type	IR diode



Digital Magnetic Compass:

Compass type	Flux gate
Azimuth Range	360 degrees / 6400mils
Inclination bank angle	+ / - 45 degrees
Display resolution	1 degree / 1 mil
Declination	+ / - 99 degrees / 999 mils

Battery:

Type	2 x CR123A
Capacity	5000 measurements

PLRF-15C Statistics (cont.)

Optics:

Configuration	Monocular
Magnification	x6 (fixed)
Objective lens	27mm
Field of view	6 degrees / 106mils @ 1,000m
Range performance	5 meters – 3000 meters
Maximum range	3,000 meters
Beam divergence	0.5 x 2.0 mils at maximum range
Accuracy	+ / - 2 m at 1500 meters
Display resolution	feet / meters / yards
Immersion	1 meter for 30 minutes

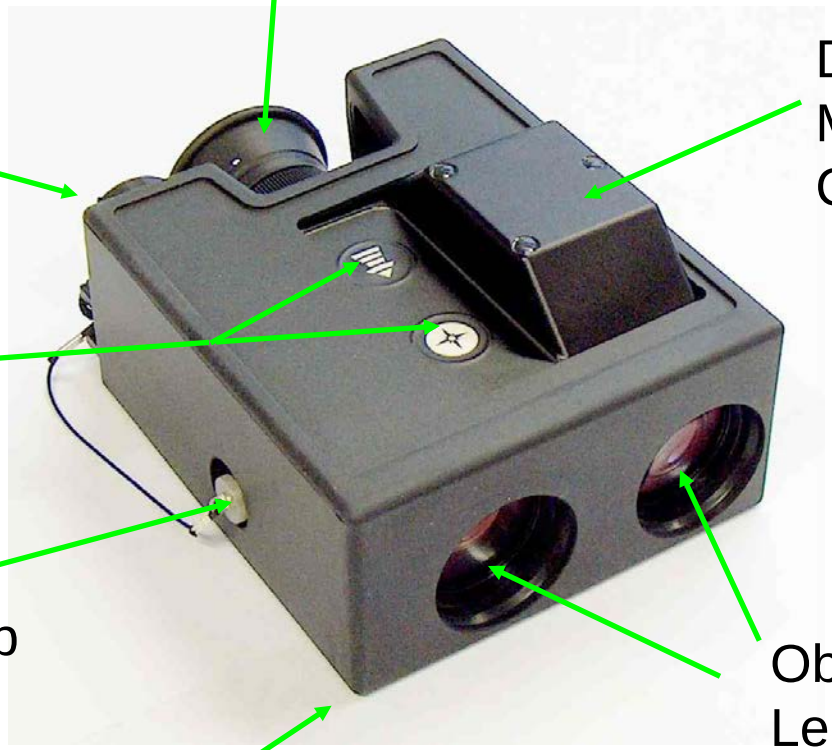
Weight:

Without battery	1.4 lbs
With battery	1.5 lbs

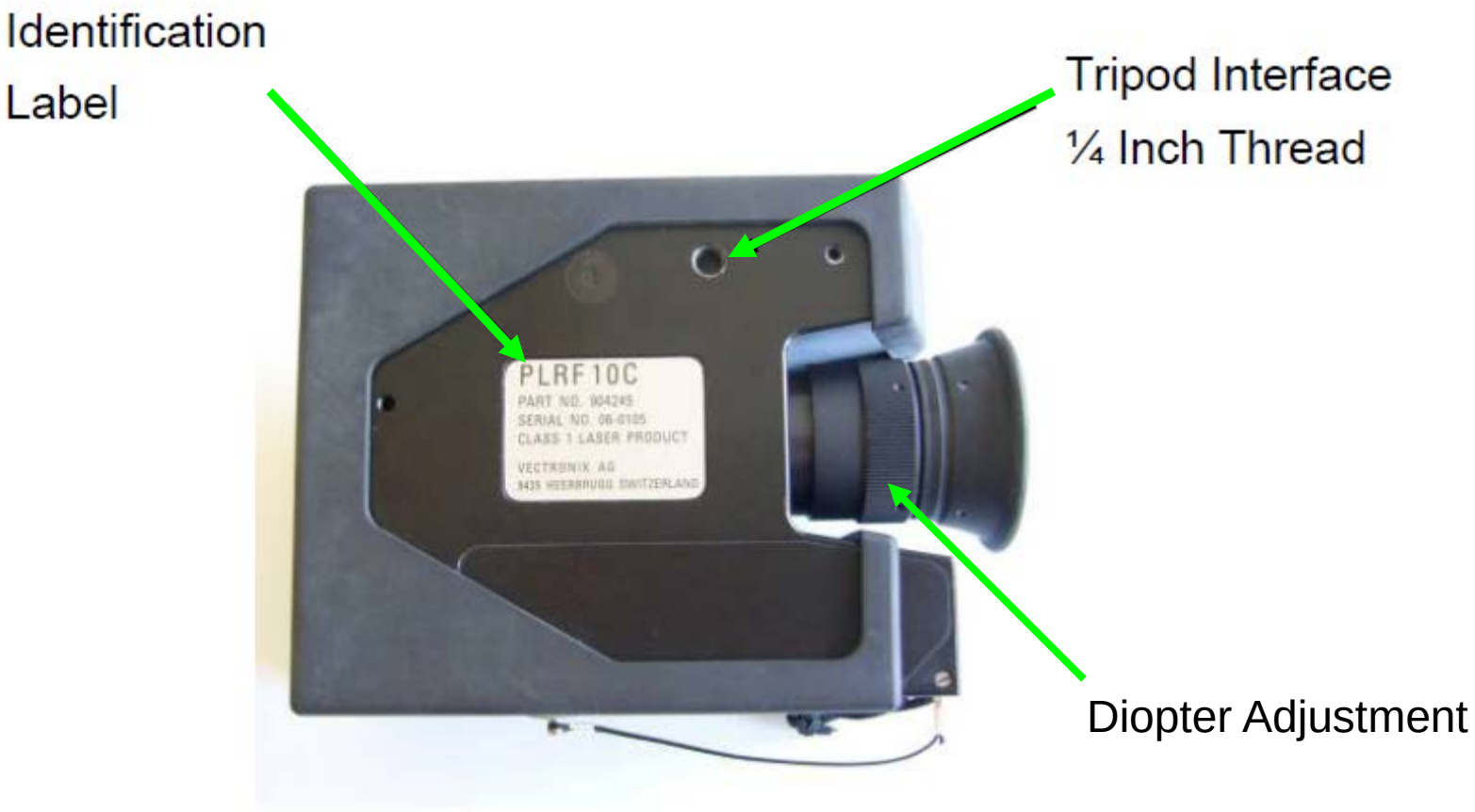
Dimensions:

Height	2.6 inches
Length	5.0 inches
Width	2.6 inches

PLRF-15C Nomenclature



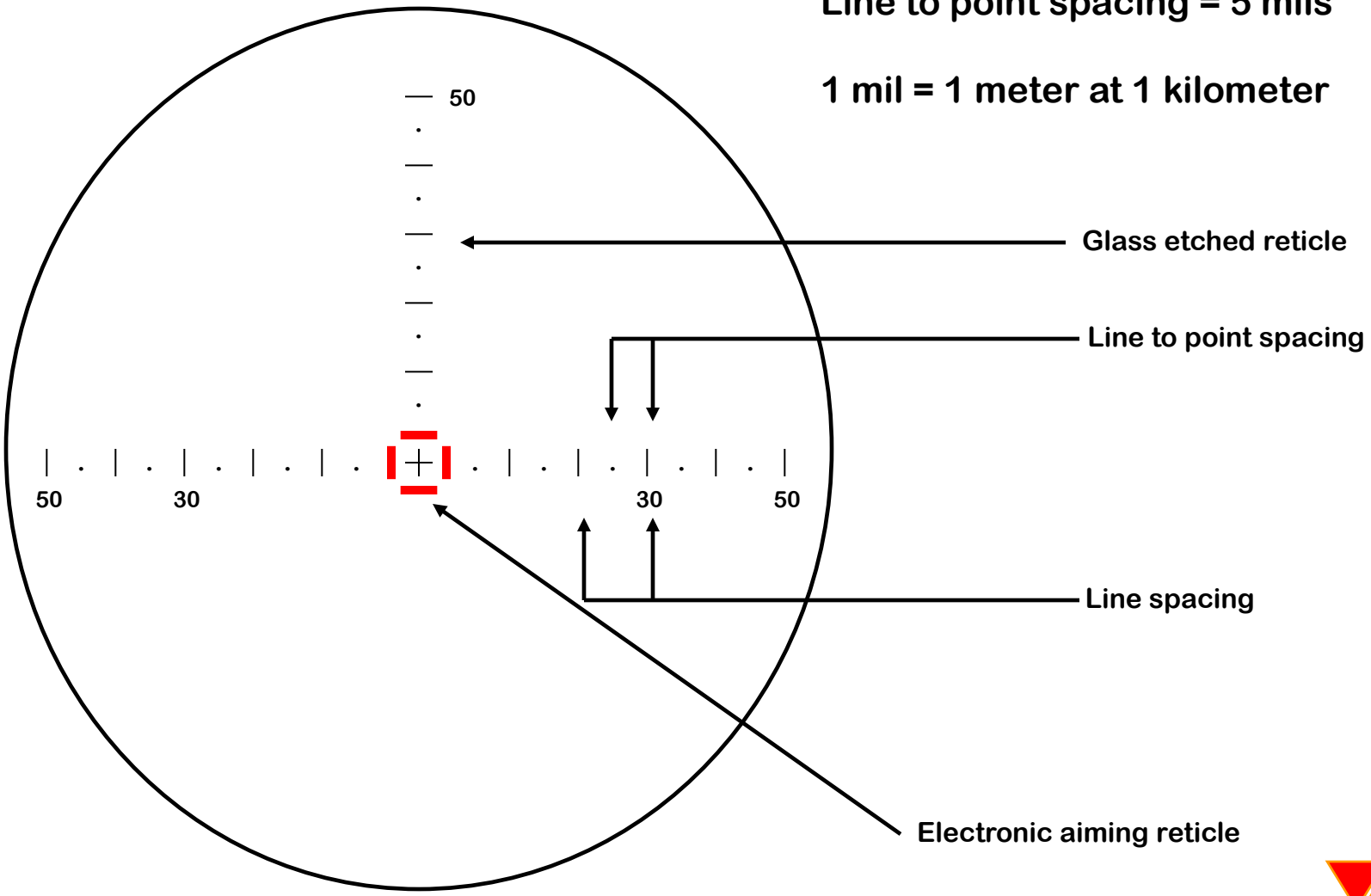
PLRF-15C Nomenclature (Cont.)



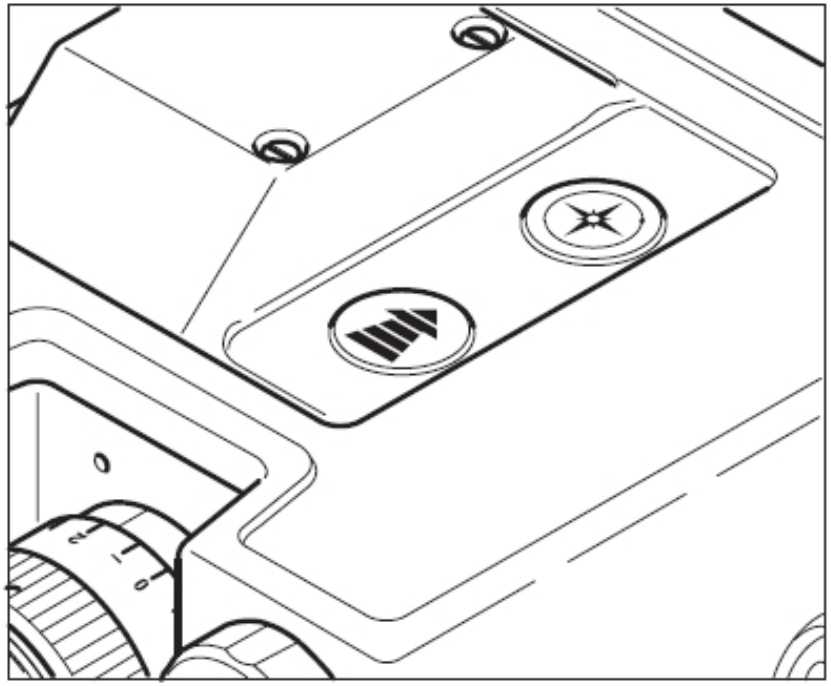
PLRF-15C Reticle

Line to line spacing = 10 mils
Line to point spacing = 5 mils

1 mil = 1 meter at 1 kilometer



PLRF-15C Function Keys

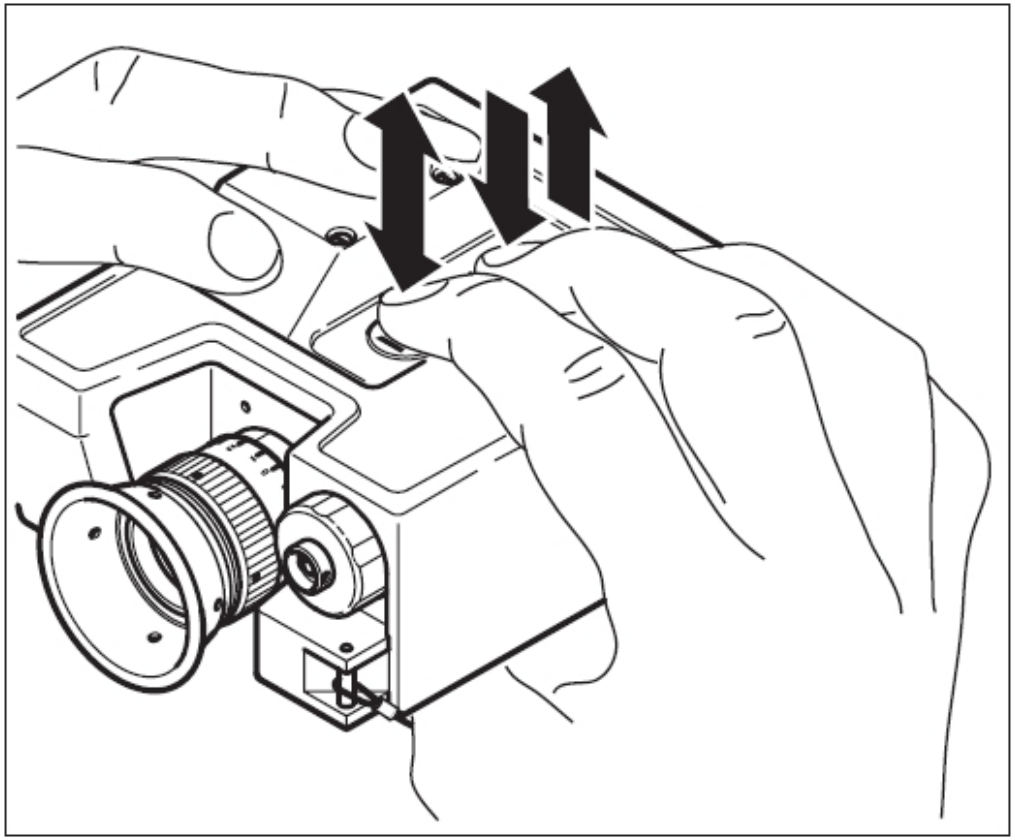


: azimuth key

: distance key

All functions in the PLRF-15C are controlled by these two keys on the top of the device.

PLRF-15C Button Manipulation

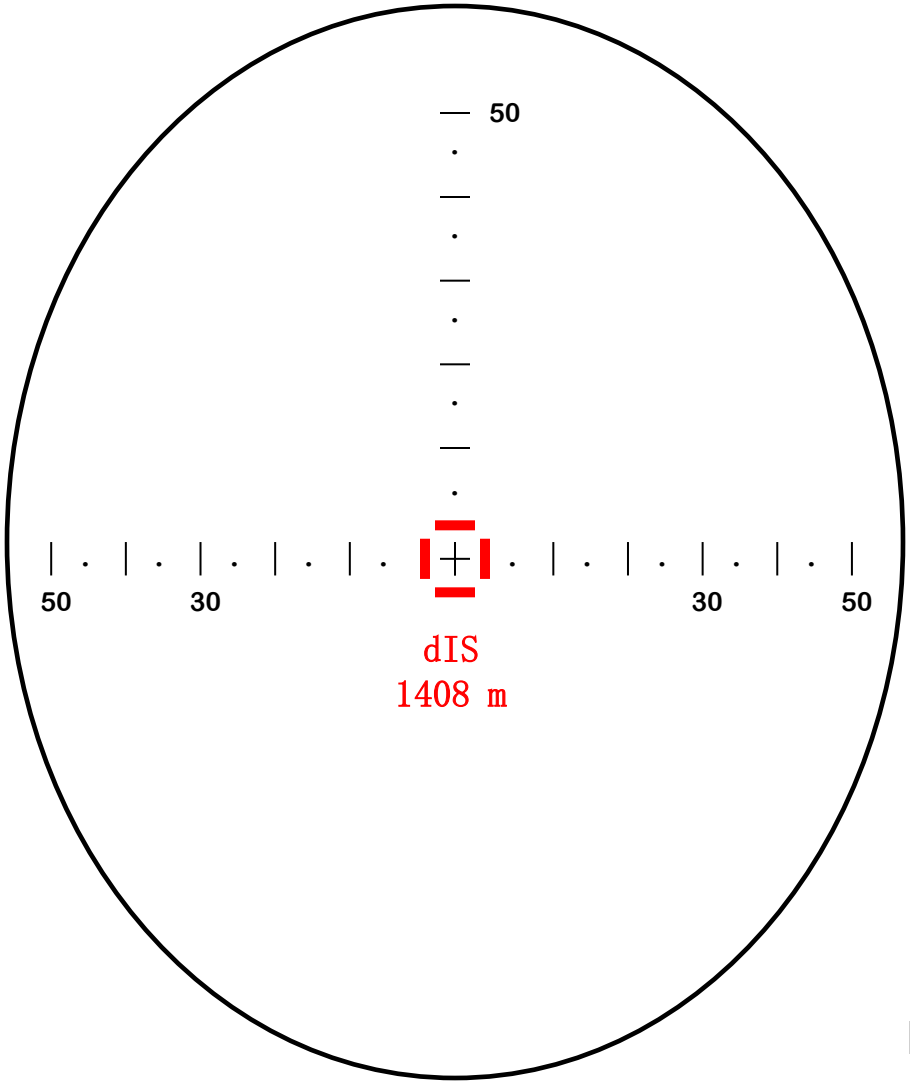


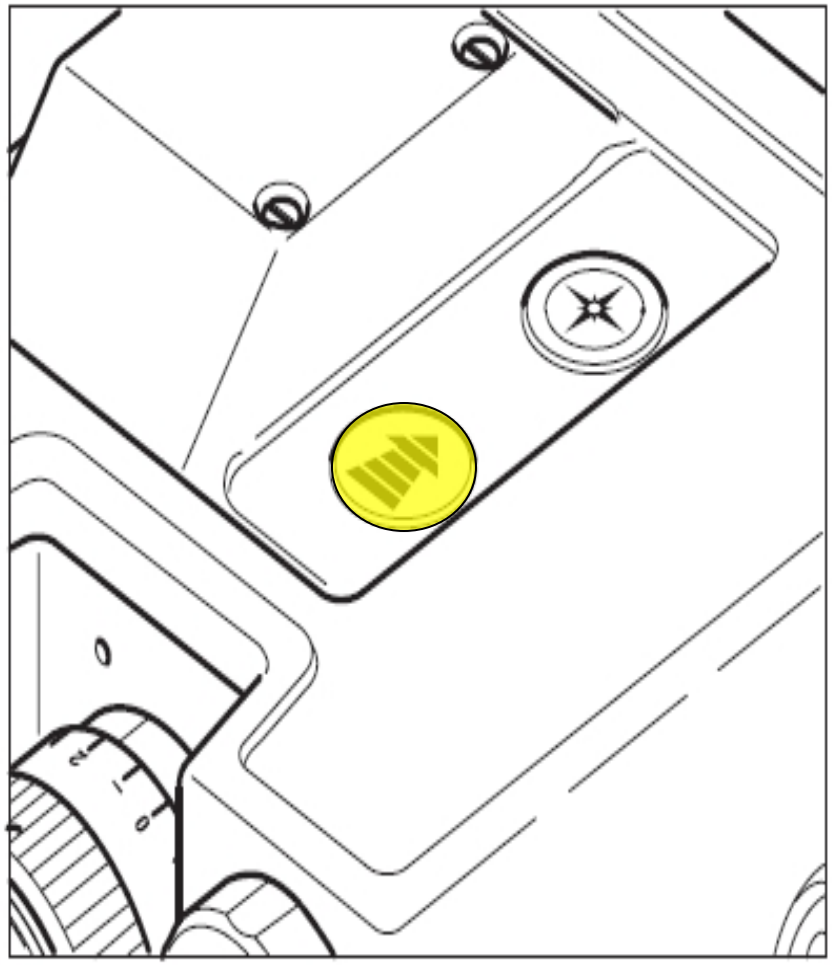
press and hold key

release key

press and release key (click)

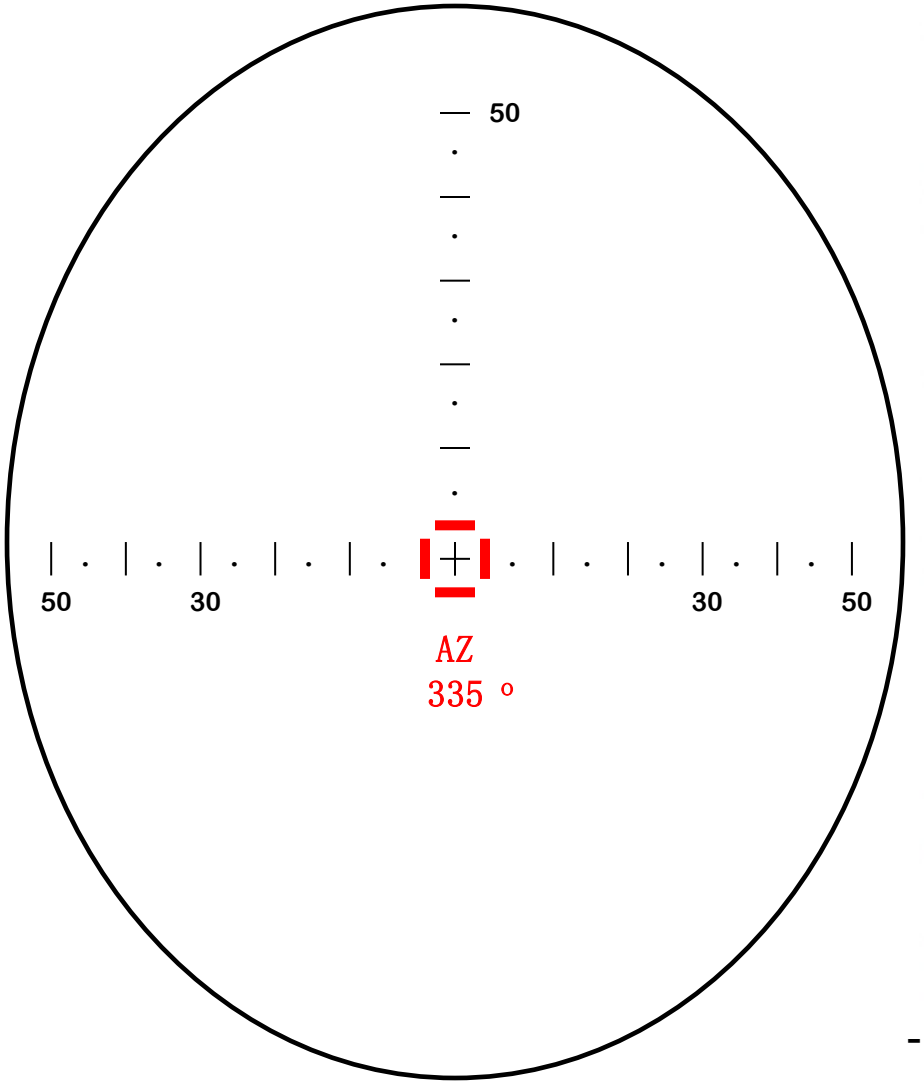
Distance Measurement

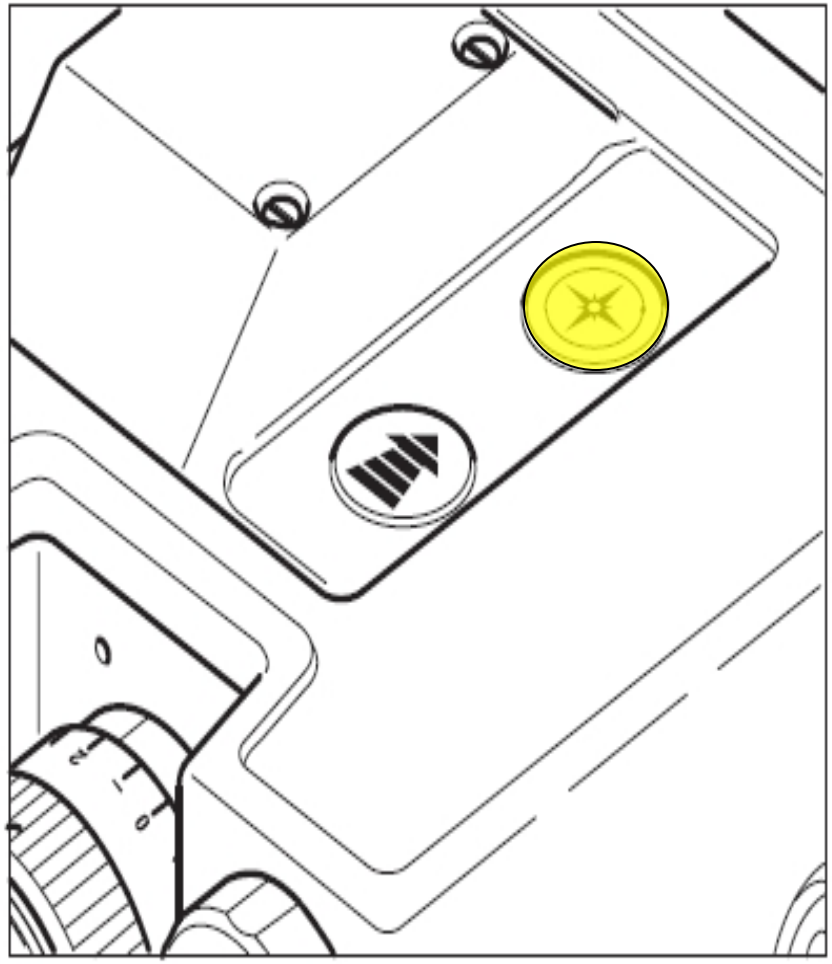




Press x1 and release to obtain Distance

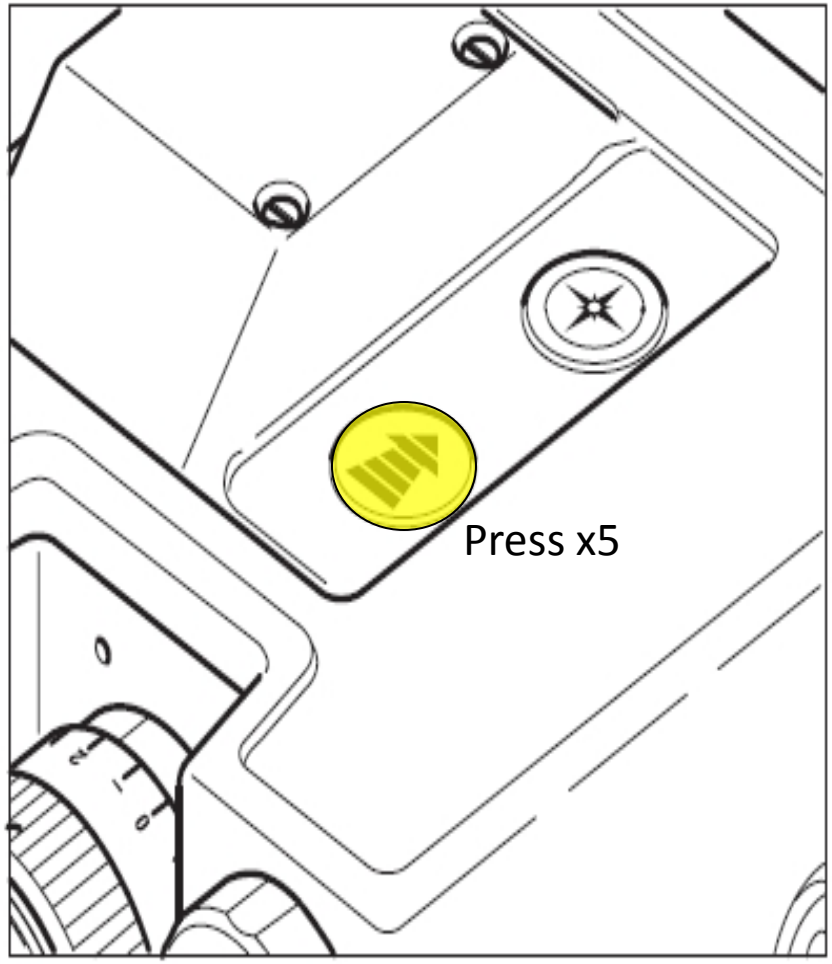
Azimuth Measurement

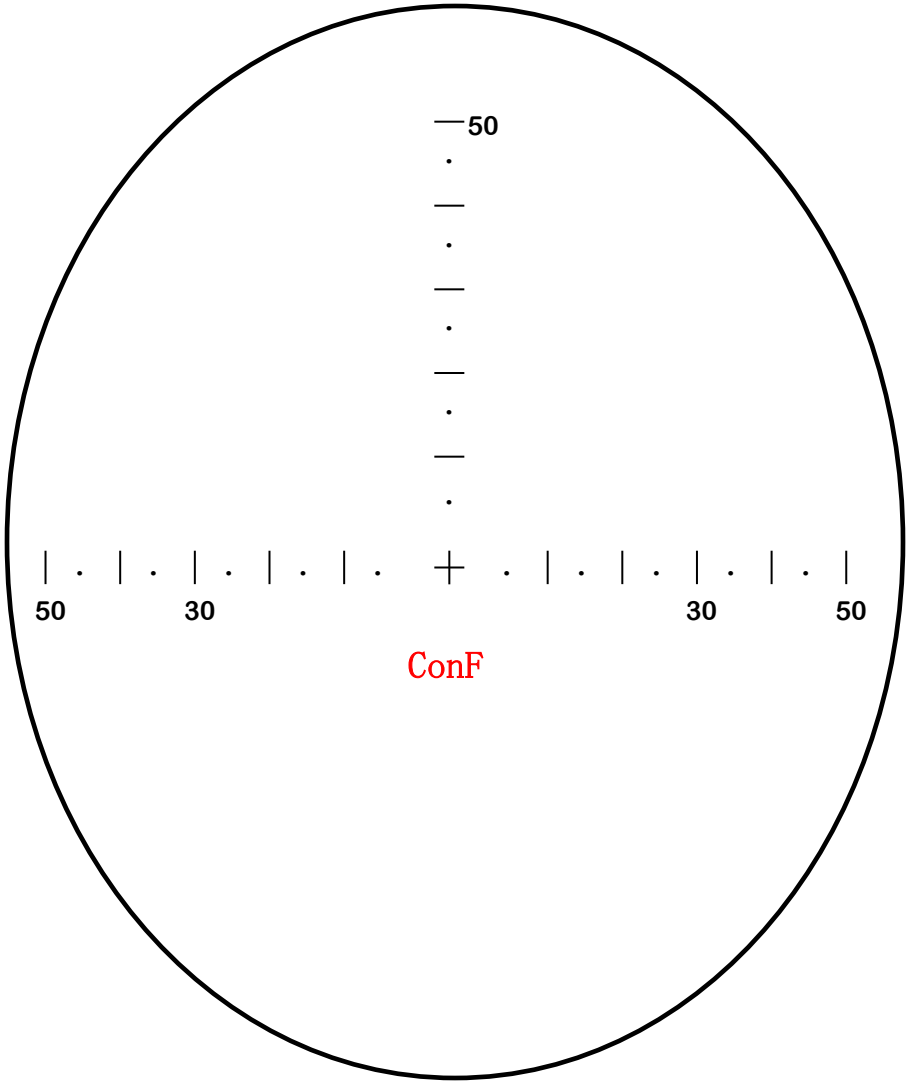




-Press x1 and release to obtain Azimuth
-Press x1 and hold – Azimuth will change in display as device is moved

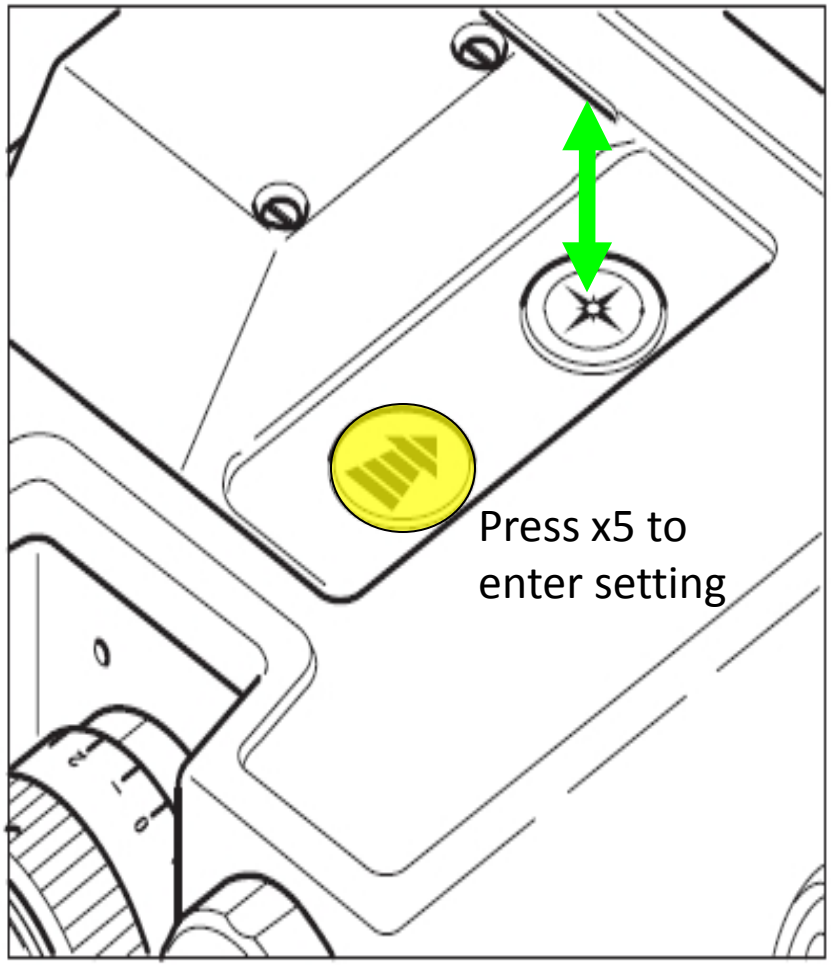
Entering Configuration Menu





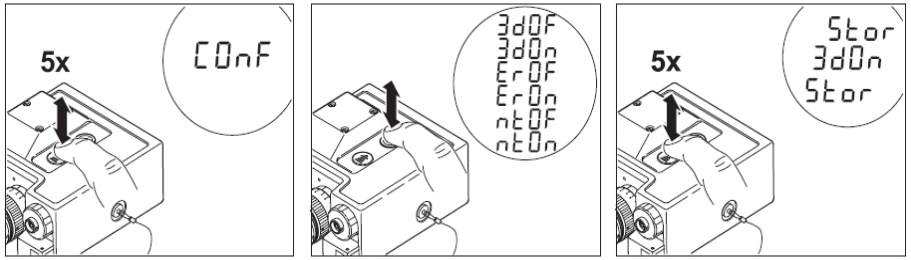
- **Press distance key x5 times to open menu**

Configuration Menu

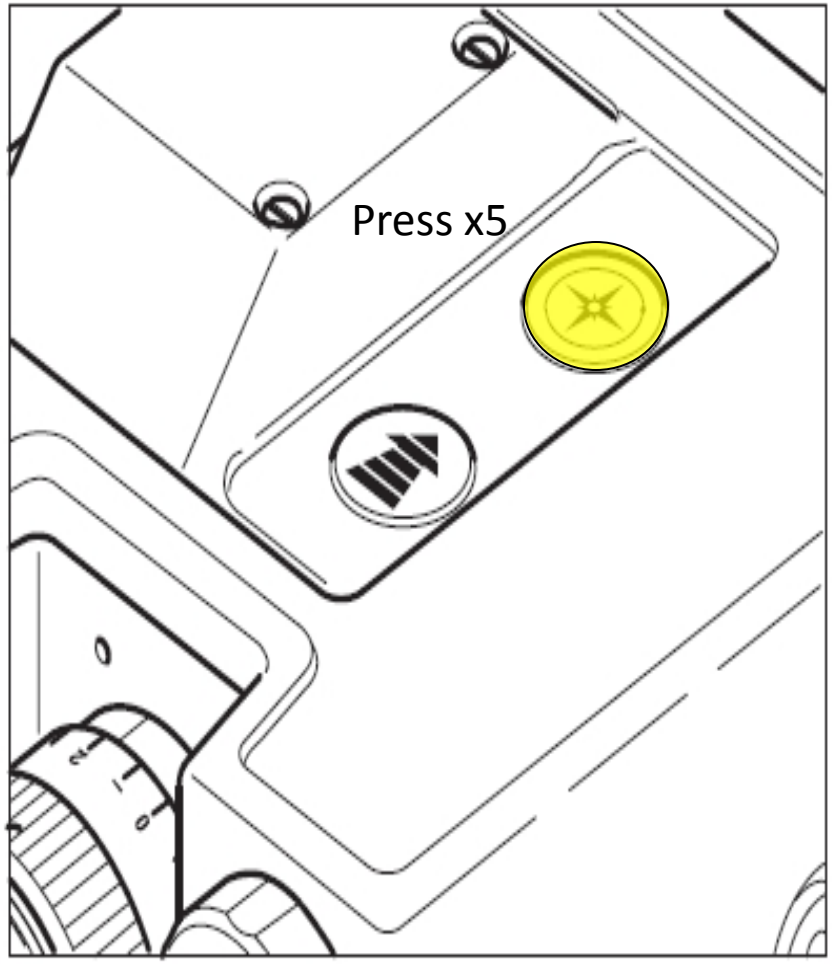


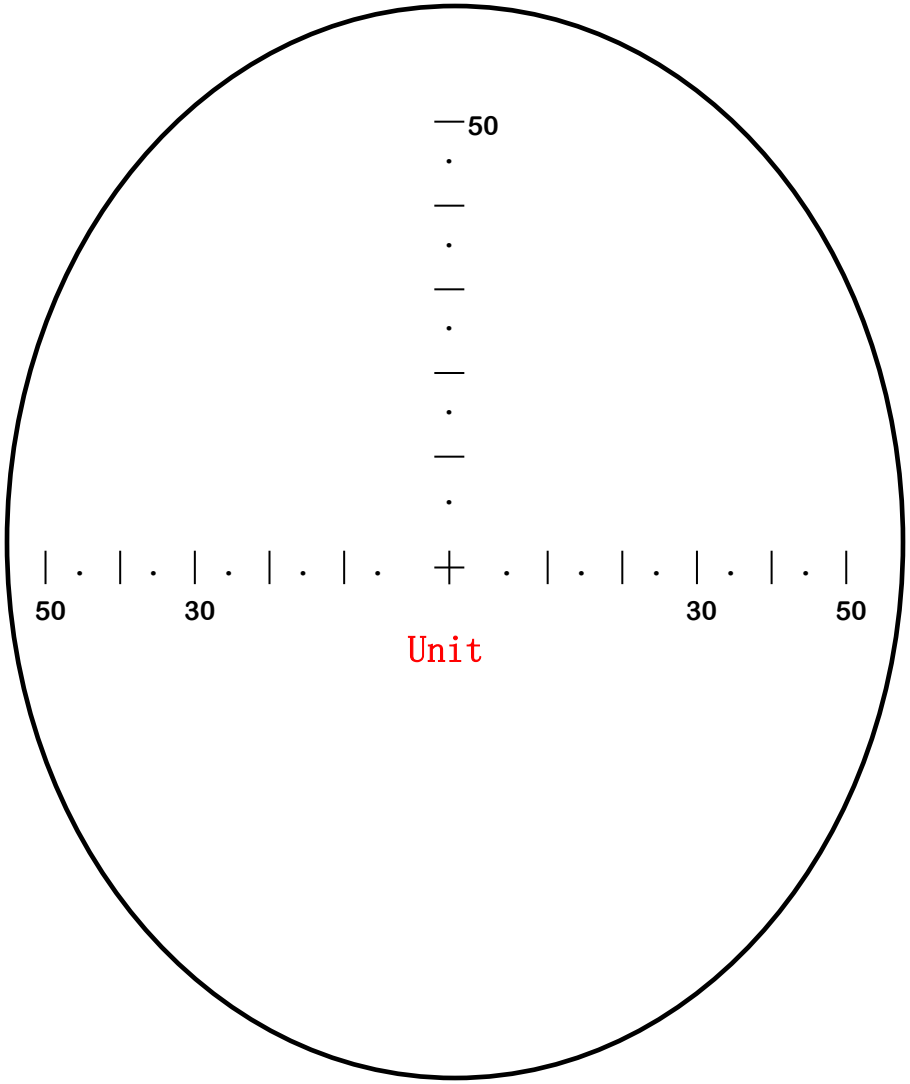
- **Press Azimuth key to scroll and select:**
  - 3 distance function ON
    3 distance function OFF
  - Electronic reticle ON
    Electronic reticle OFF
  - Night display ON
    Night display OFF

- **Press distance key x5 times to store setting**



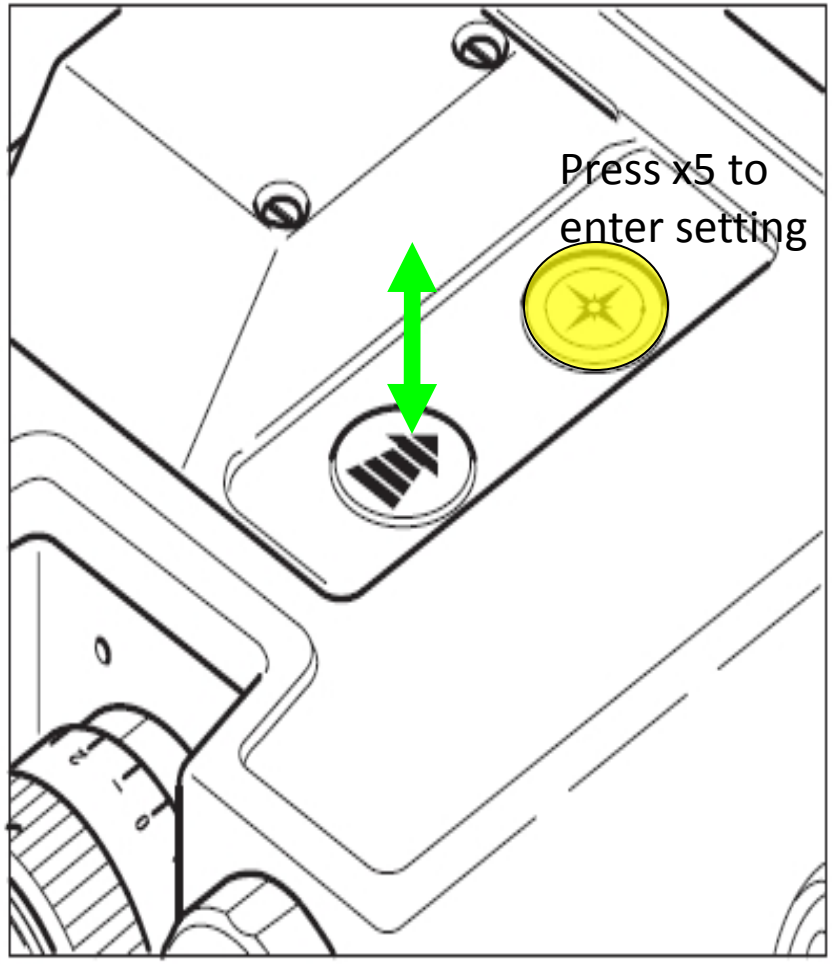
Entering Distance Units Menu



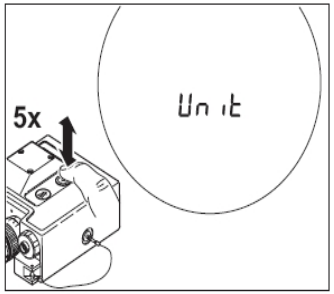


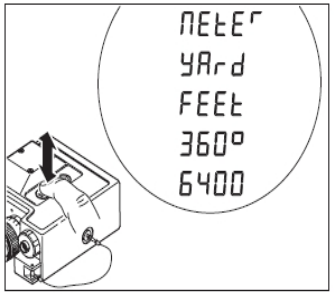
- **Press azimuth key x5 times to open menu**

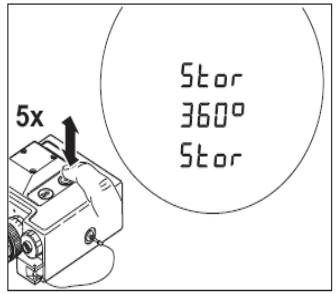
Distance Units Menu



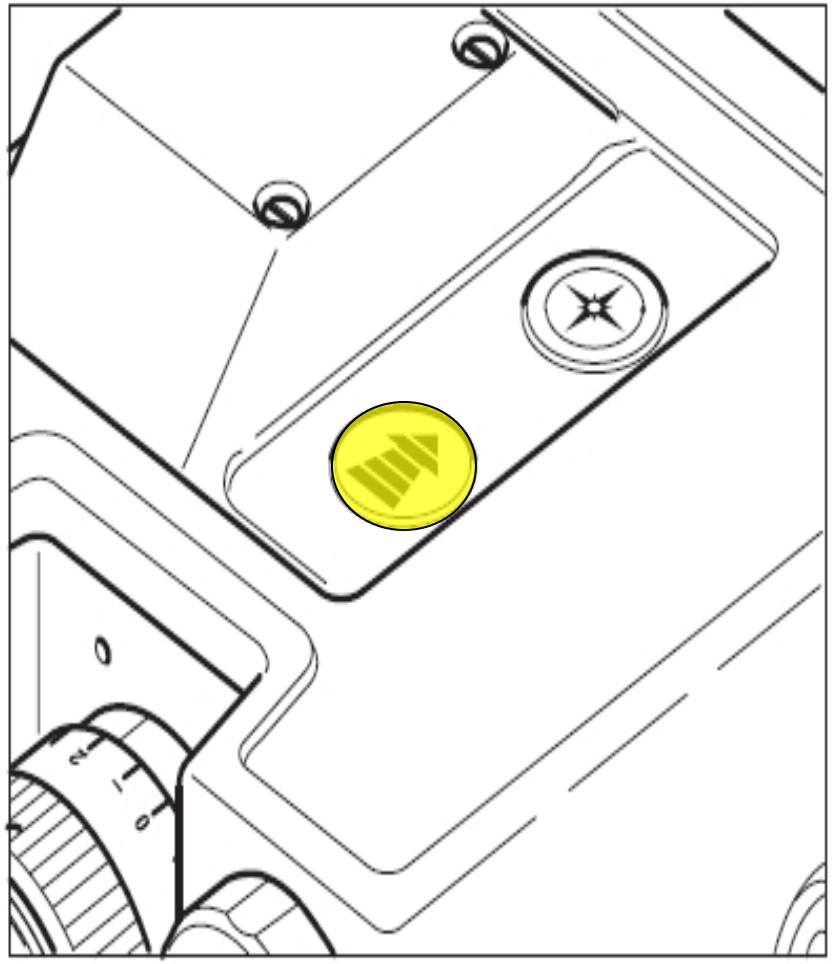
- **Press distance key to scroll and select:**
  - Yards
    Meters
    Feet
  - 360 degrees
    6400 mils
- **Press azimuth key x5 times to enter setting**



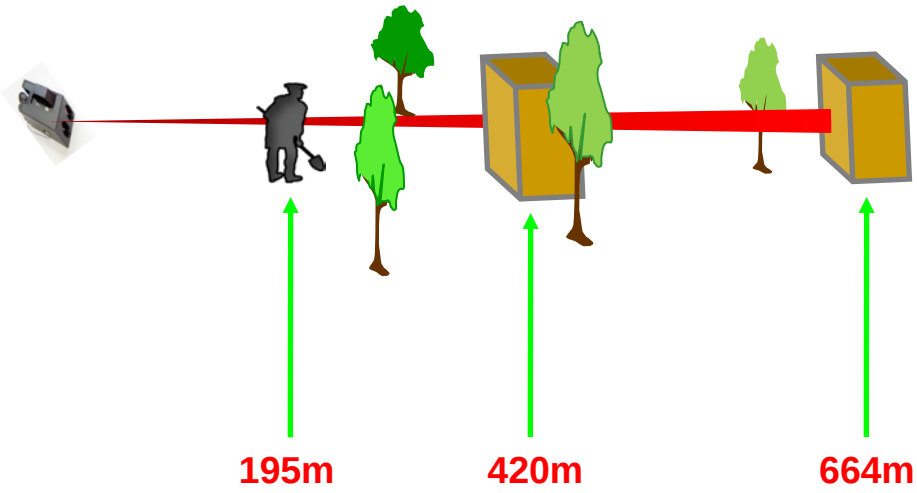




Multiple Object Measurement

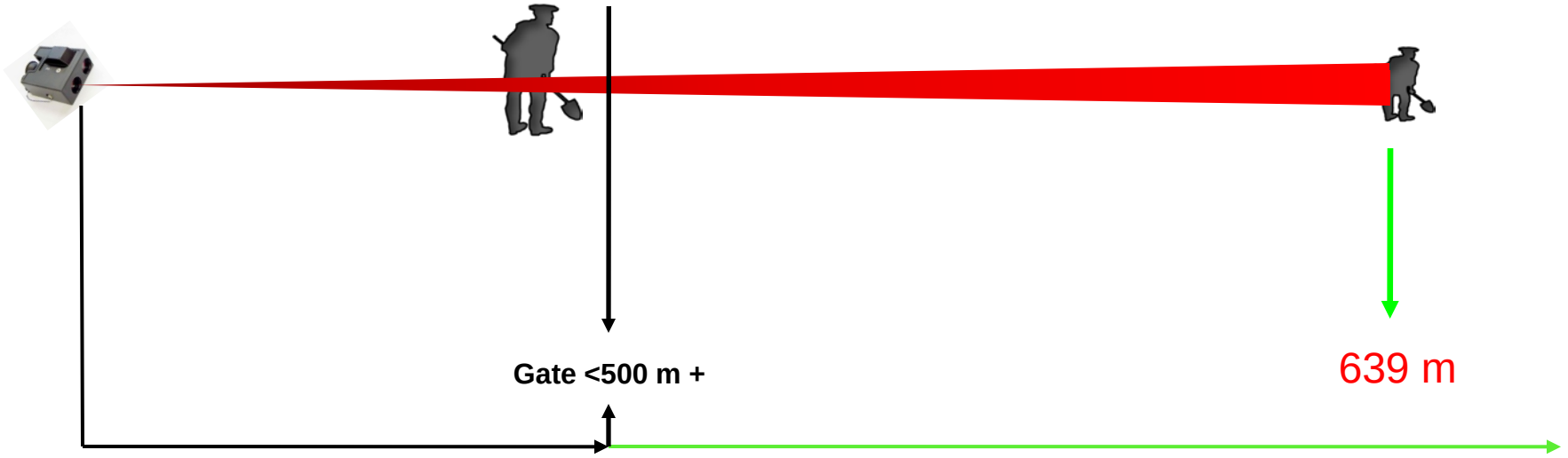


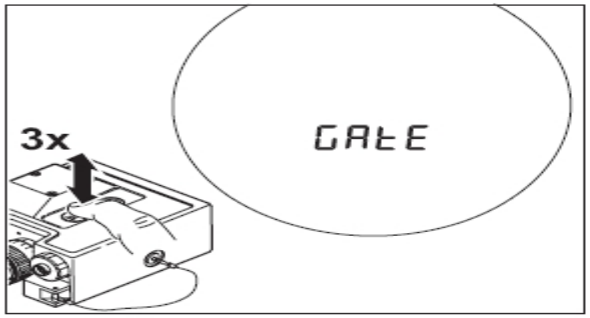
- **Enter Configuration menu, select 3dON**
- **Press Distance key to obtain measurement:**
  - Will measure the 3 strongest values

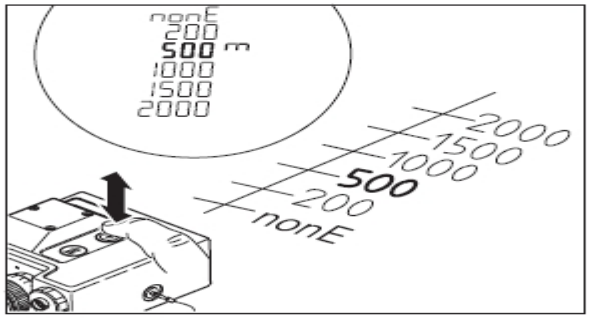


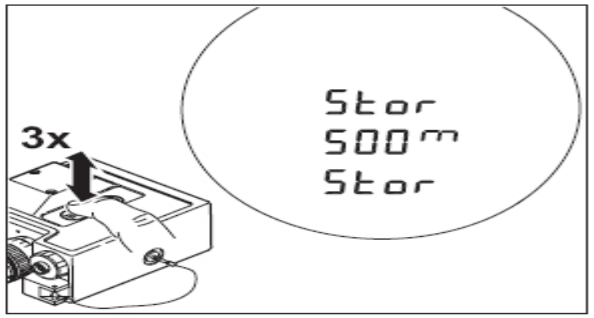
- **Press distance key to scroll through measured distances in order of strongest measurement to least strongest detected**

Distance Gate Function



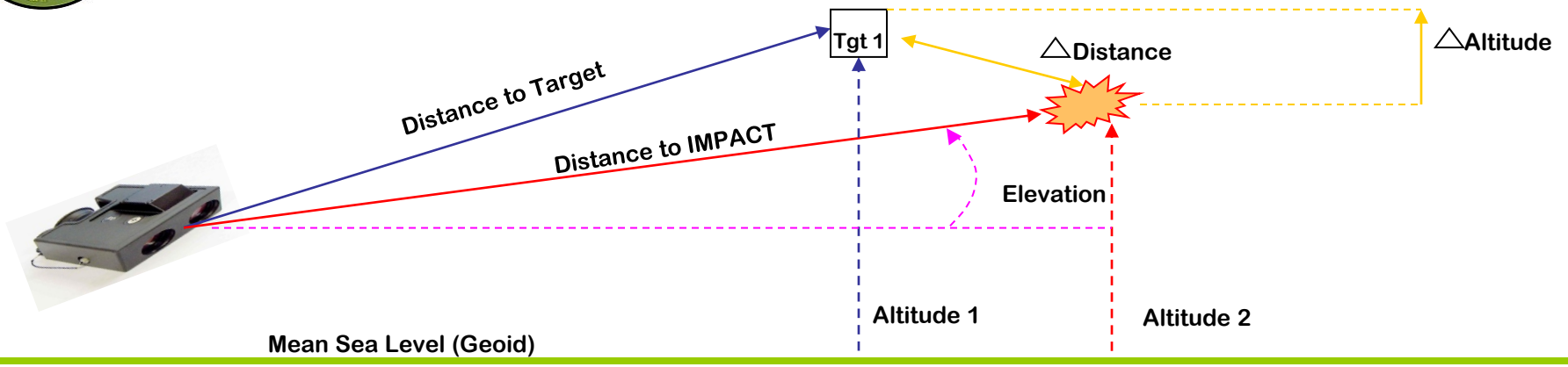


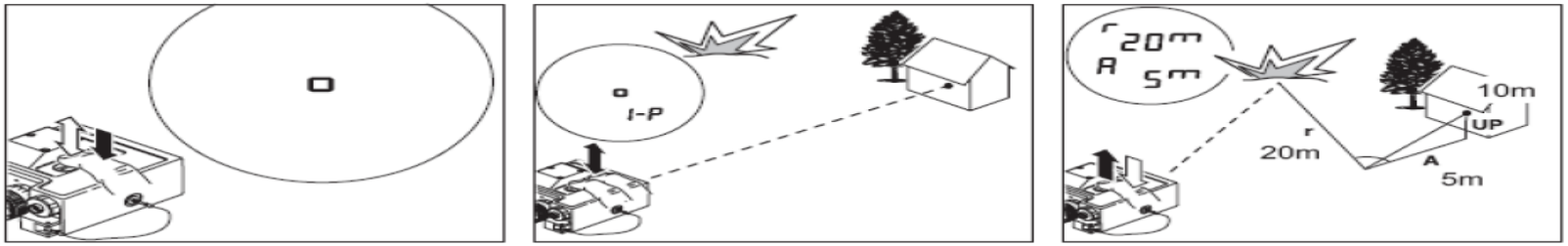




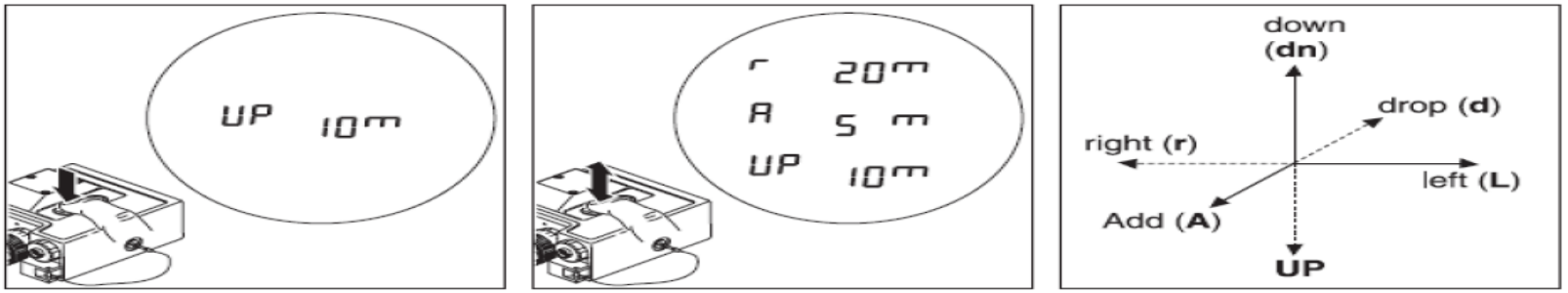
- **When a distance gate value is set, any target ranged within the set distance will result in no reading and GAtE being displayed**

Fall of Shot Program





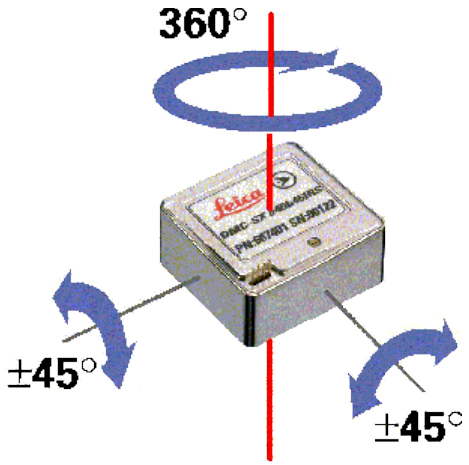
- Press Distance x2 and hold and then press Azimuth x1 – hold both while sighting desired target.
- **1-P** should appear (First Point). Hold buttons and sight fall of shot.



- Release buttons and first correction will appear. Press Distance key repeatedly to scroll through deflection, add/drop, and change in elevation measurements.

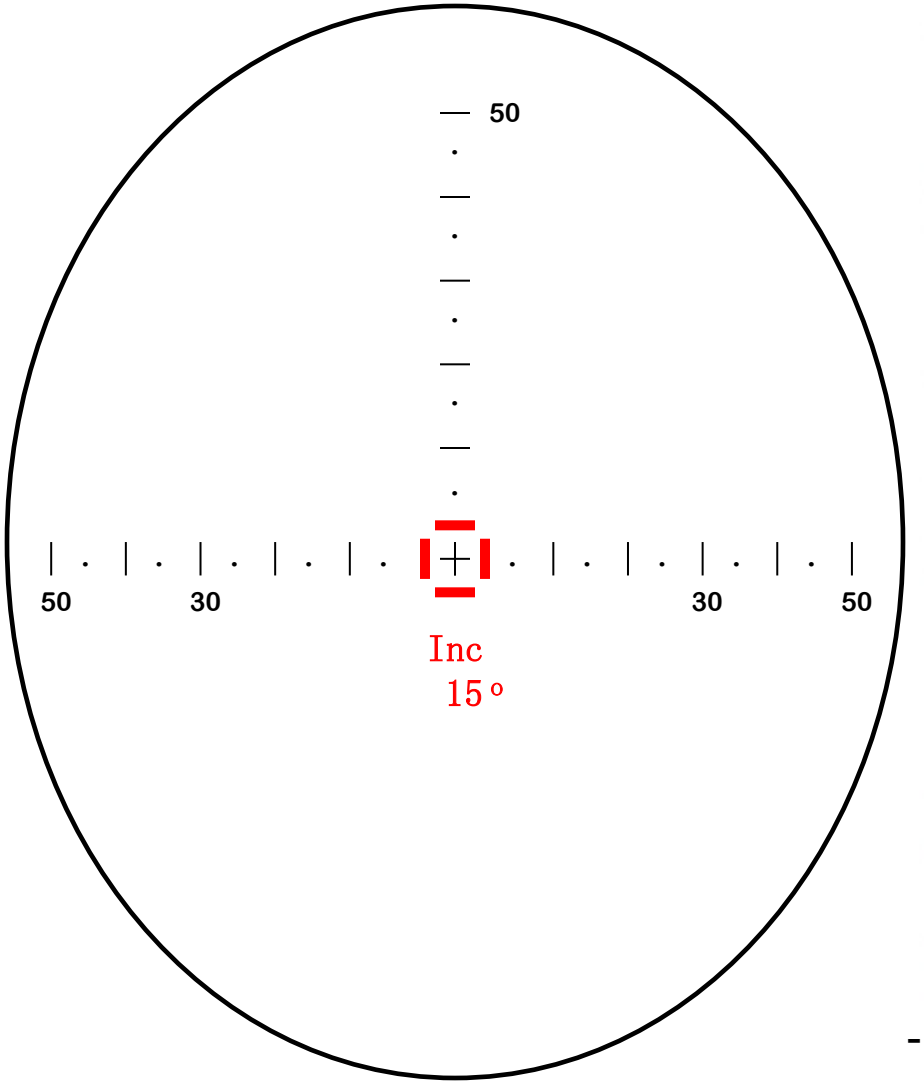
Azimuth and Inclination Measurements - Basics

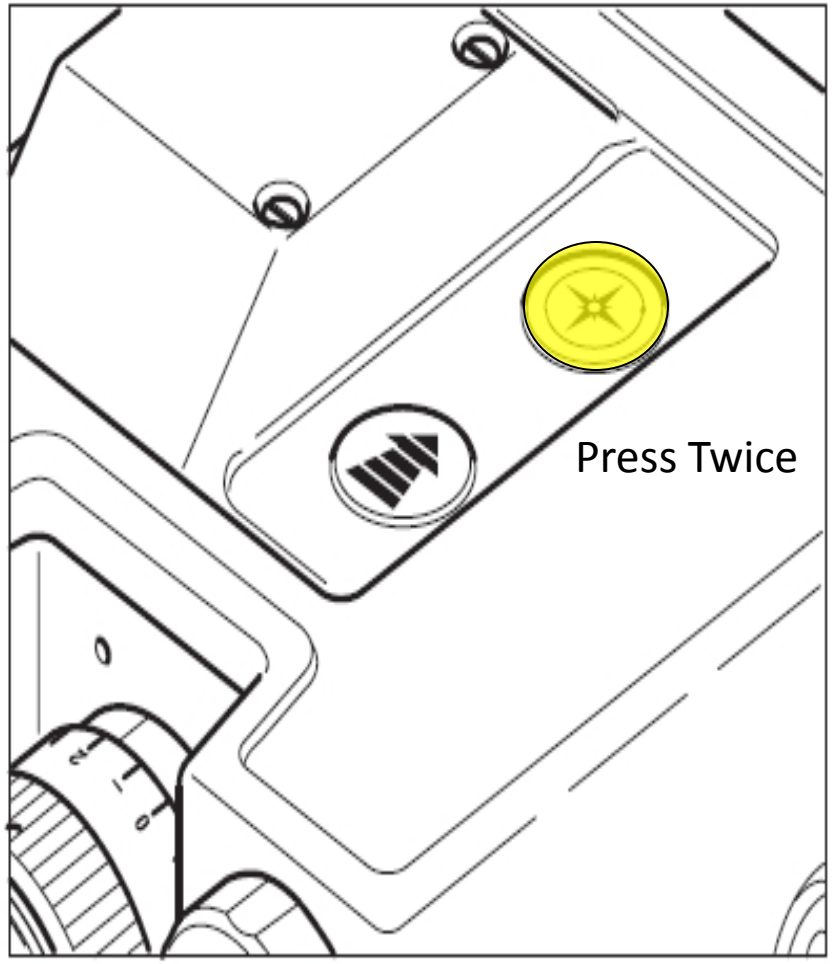
The device contains a digital magnetic compass (DMC) which provides azimuth and inclination data.



- Metal objects, magnetic fields and electronic devices can cause errors in azimuth readings.

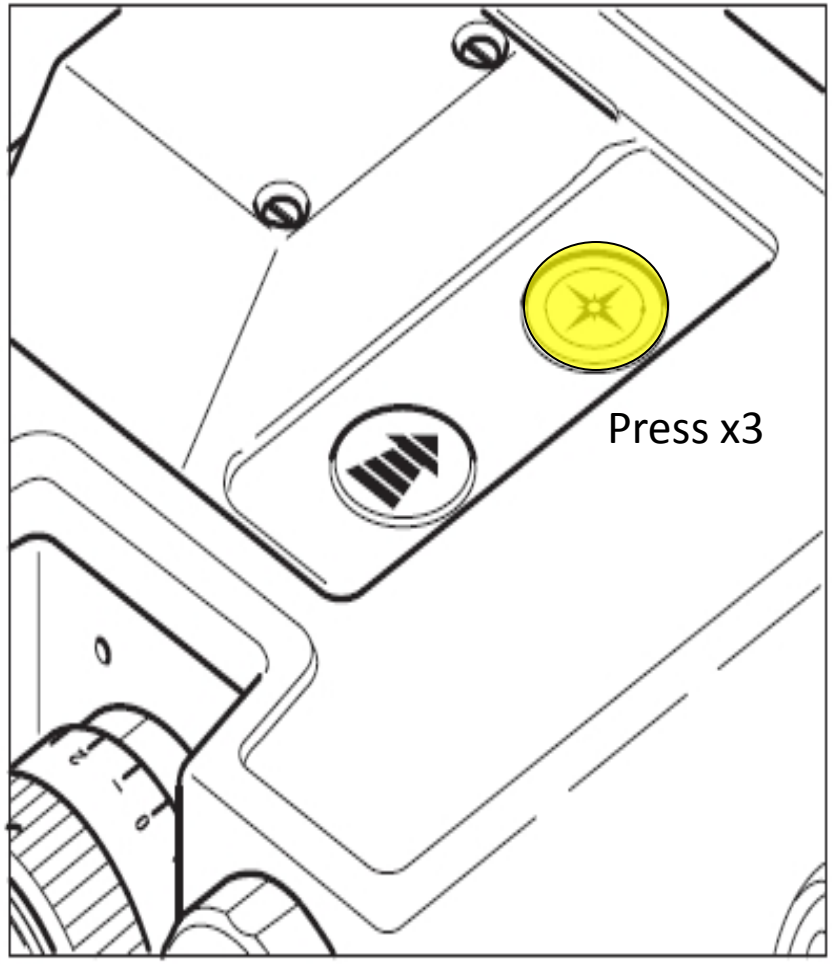
Inclination Measurement

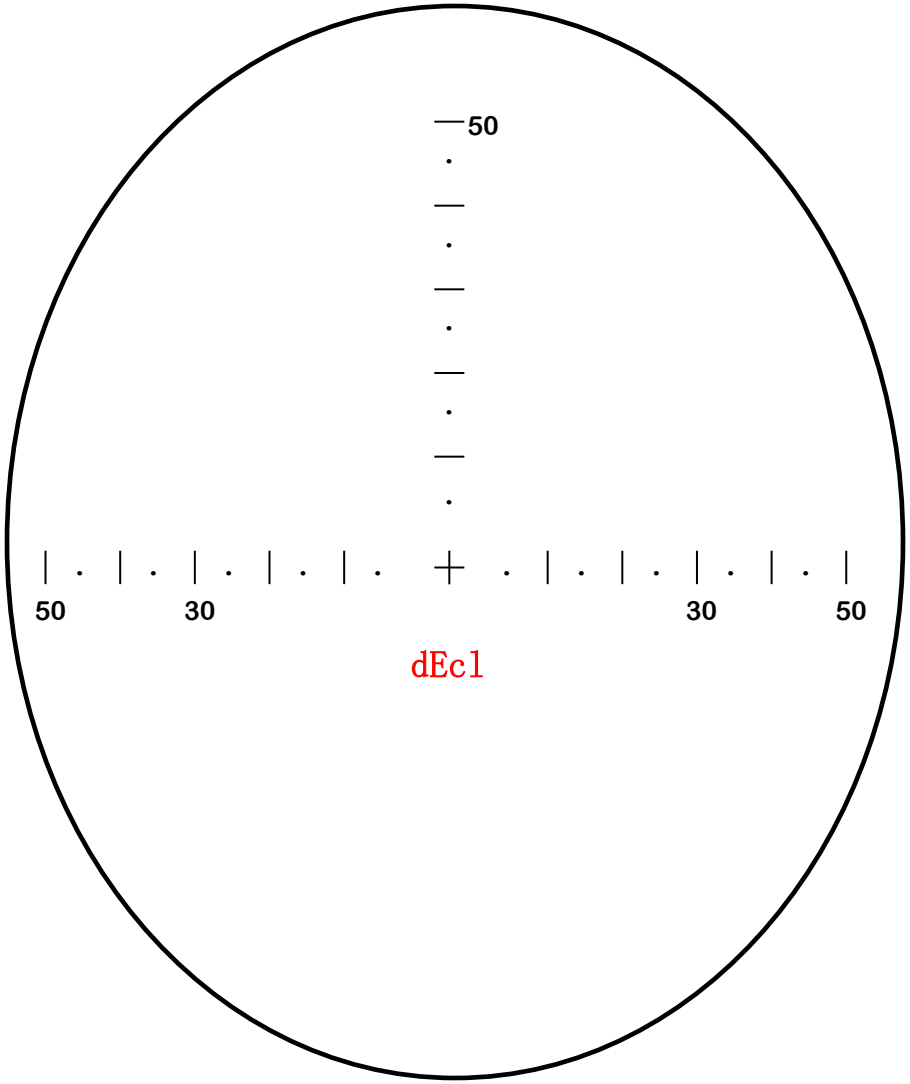




-Press x2 and release to obtain Inclination
-Press x2 and hold – Inclination will change in display as device is moved

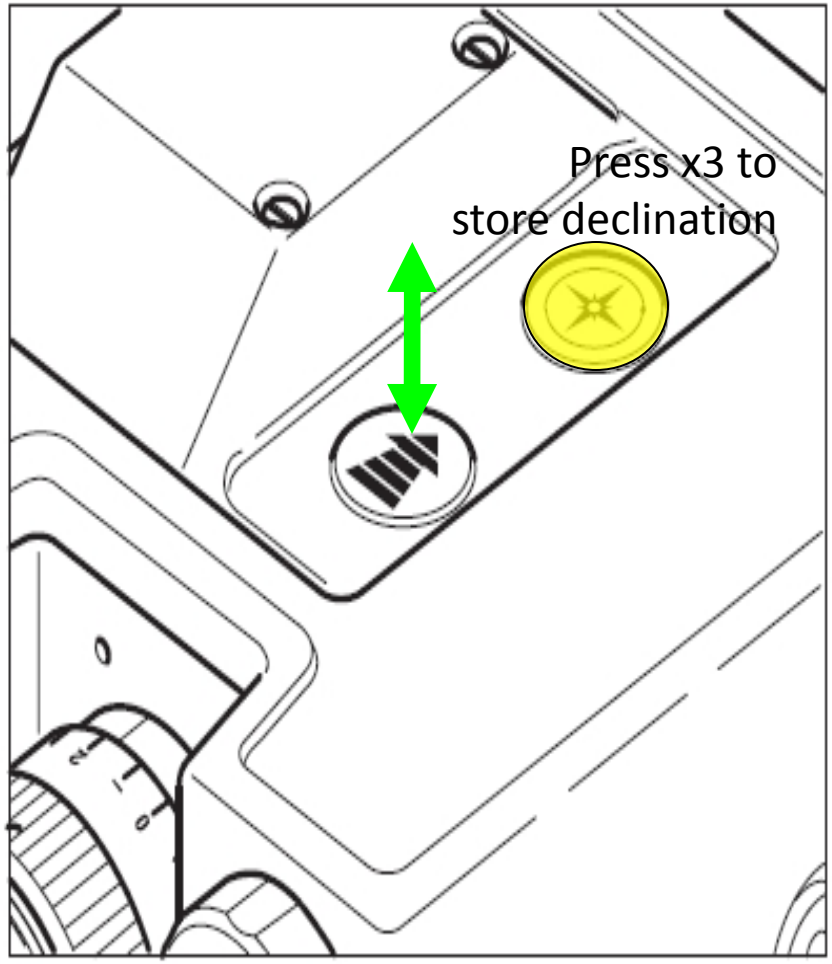
Entering Declination Menu



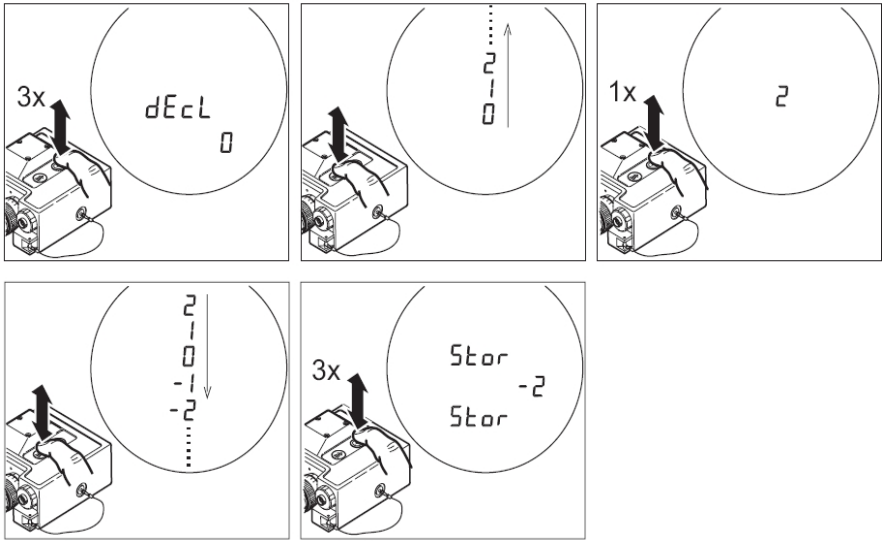


- **Press Azimuth key x3 times to open menu**

Declination Menu



- **Press distance key to set declination angle:**
  - Press Distance key once repeatedly to change value one at a time
  - Press Distance key and hold to scroll through values quickly. Release when desired value is reached.



- **Press azimuth key x3 times to store value**

4 and 12 Point Compass Calibration

Calibration is intended to take into account the magnetic disturbances surrounding the user's position and the PLRF-15C, or any changes near a magnetic field or any other modifications.

4 Point:

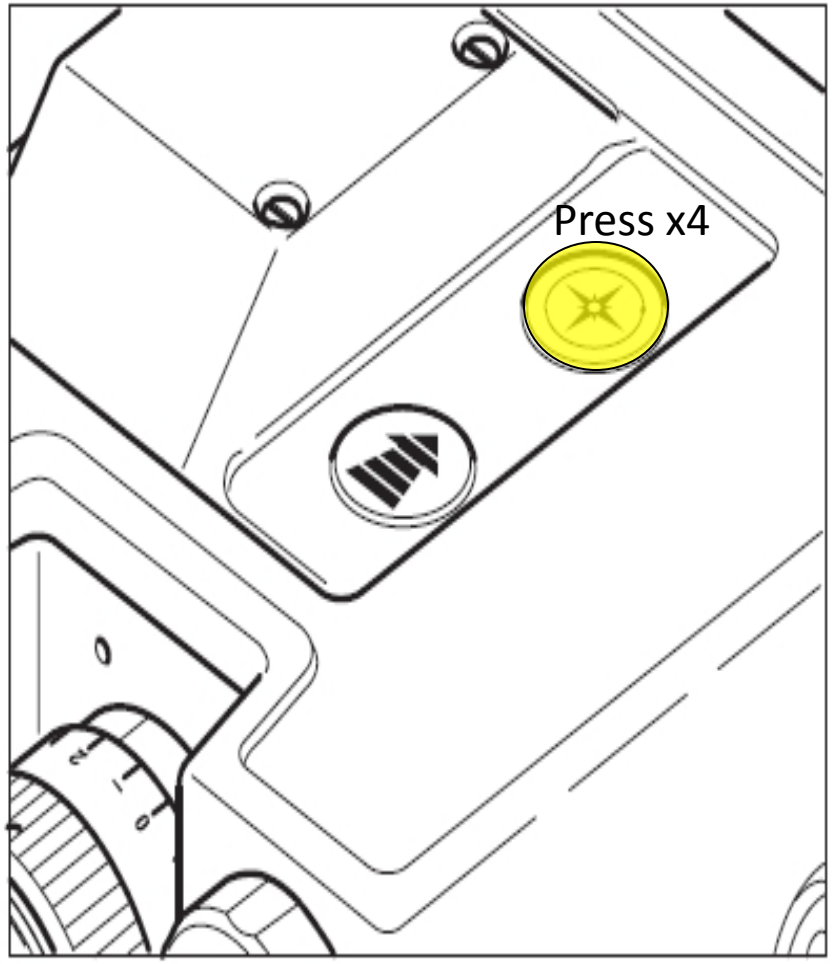
Field-expedient calibration for when time does not allow for a full calibration. Most basic functions should perform with adequate precision.

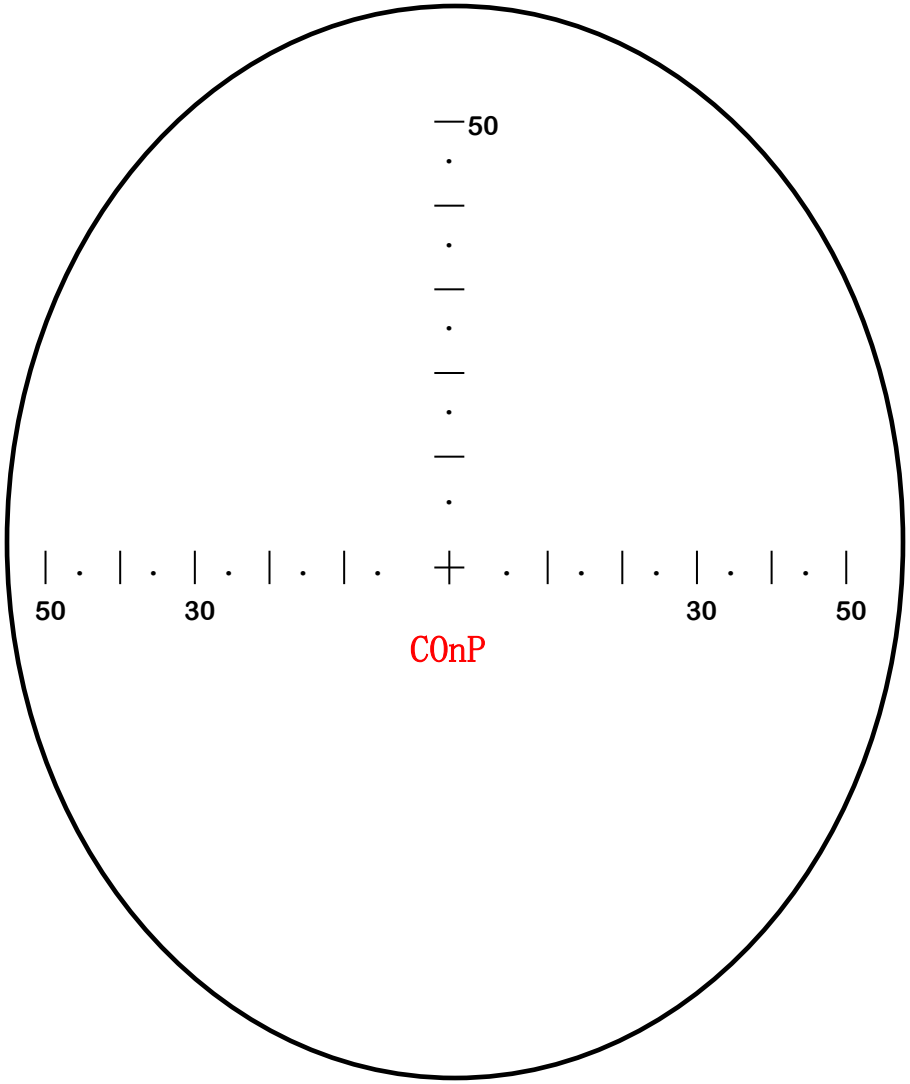
12 Point:

Provides best precision for all functions. Preferred method of calibration when time allows.

When to Calibrate: After every battery change, when device has been exposed to strong magnetic fields, when metallic parts (such as NVGs) have been attached, after large temperature changes, after movement greater than 20 km or to a different terrain type, after long periods of storage.

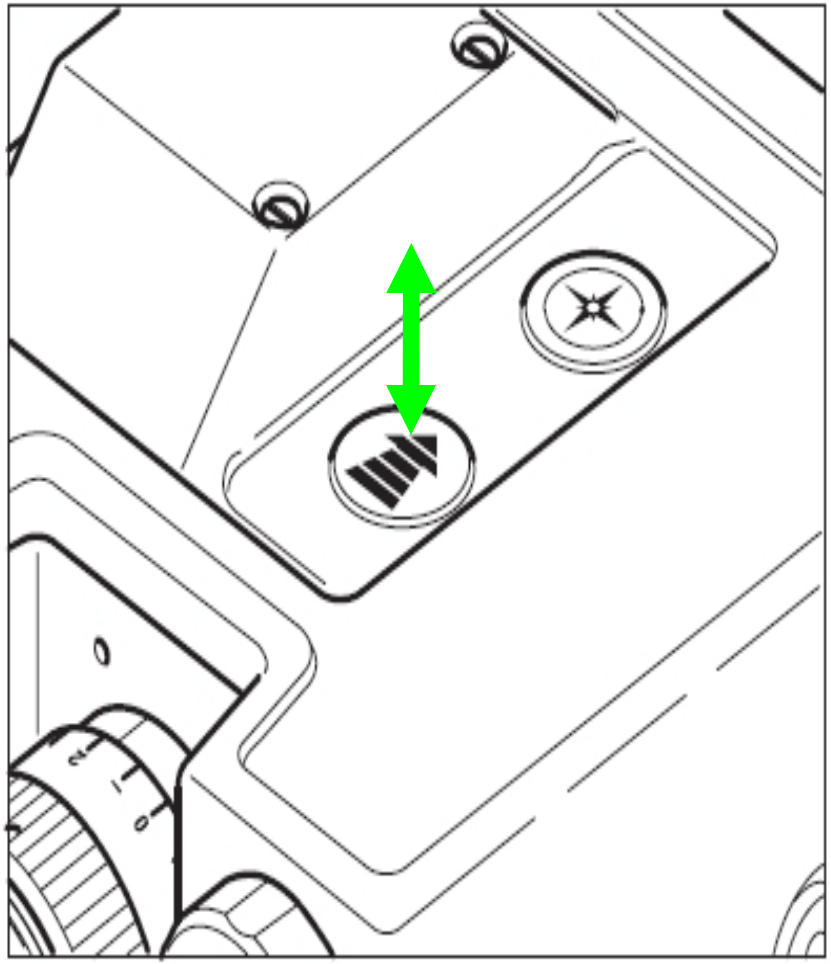
Compass Calibration Menu



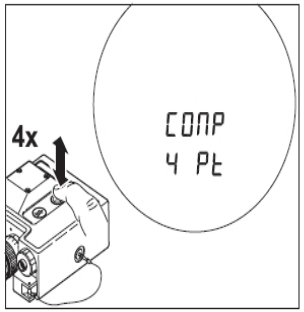


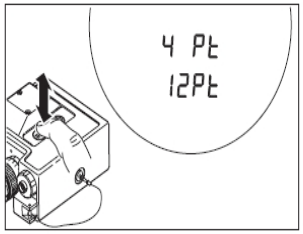
- **Press azimuth key x4 times to open menu**

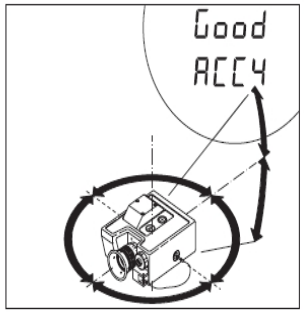
Calibration Menu



- **Press Distance key to select either:**
  - 4 point compass calibration
  - 12 point compass calibration
- **Once 4 Pt or 12 Pt is selected the device will begin the selected calibration**

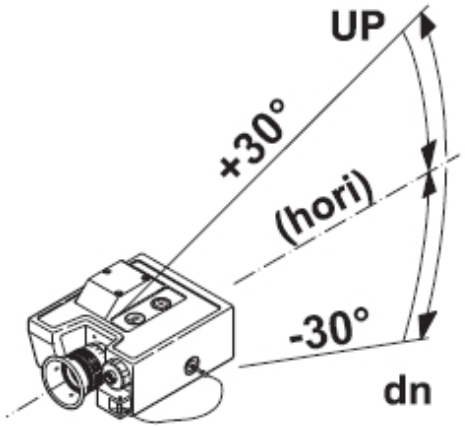


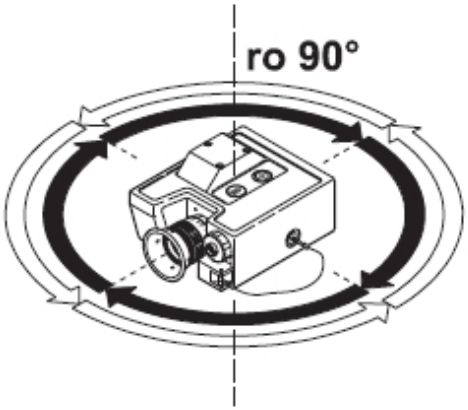


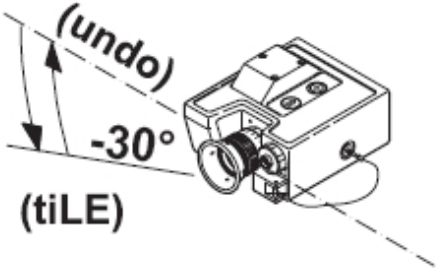


- **Follow directions in the display**
- **If calibration is successful, Good will display**

Compensation Instructions







StOP	hold device still
UP	turn up
dn	turn down
ro90°	rotate 90°
hori	hold device horizontal
tiLe	tilt left side of device downwards
undo	undo tilt, return to horizontal
tFAr	too far, reverse direction

Compass Compensation - Results

- After a completed compensation, the result is displayed.
- The accuracy value (ACC) is shown in the currently selected angular unit (degrees or mils).
- If bAdC appears, redo procedure until Good appears or consider relocating position.

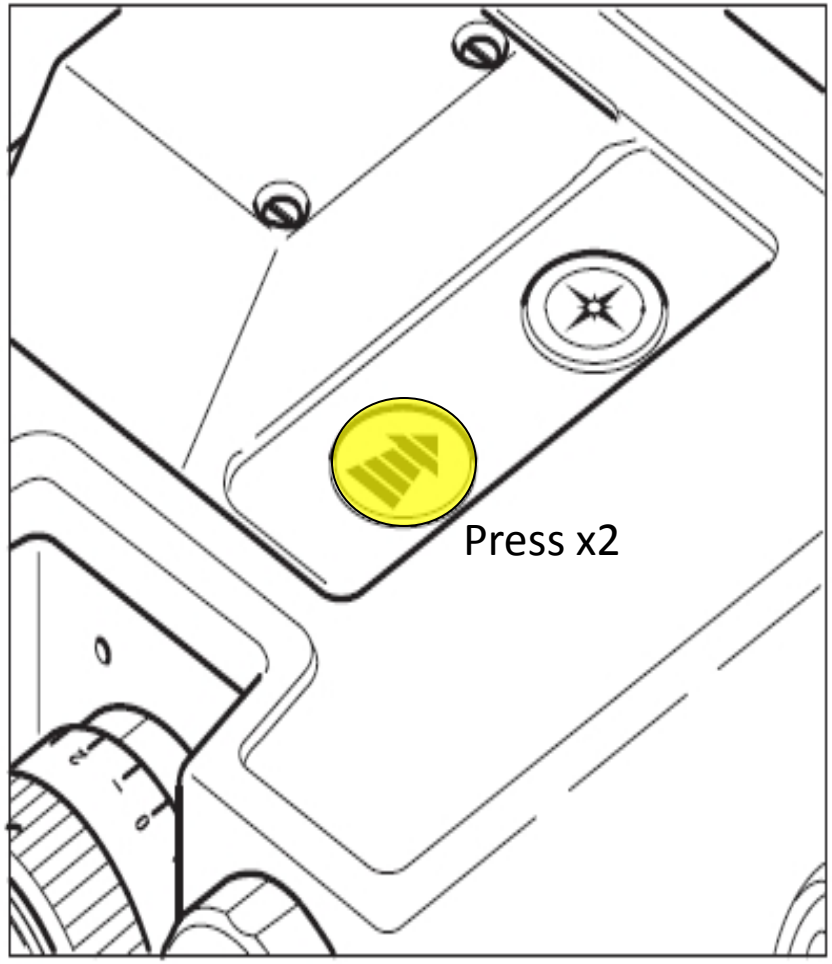
ACC (mil)	Display (FoV)	Process
1 – 20	6ood ACC 10 (example)	New determined constants are stored
21 – 90	bAdC ACC 45 (example)	New determined constants are stored
> 90	bAdC rESC	Constants are reset to factory values

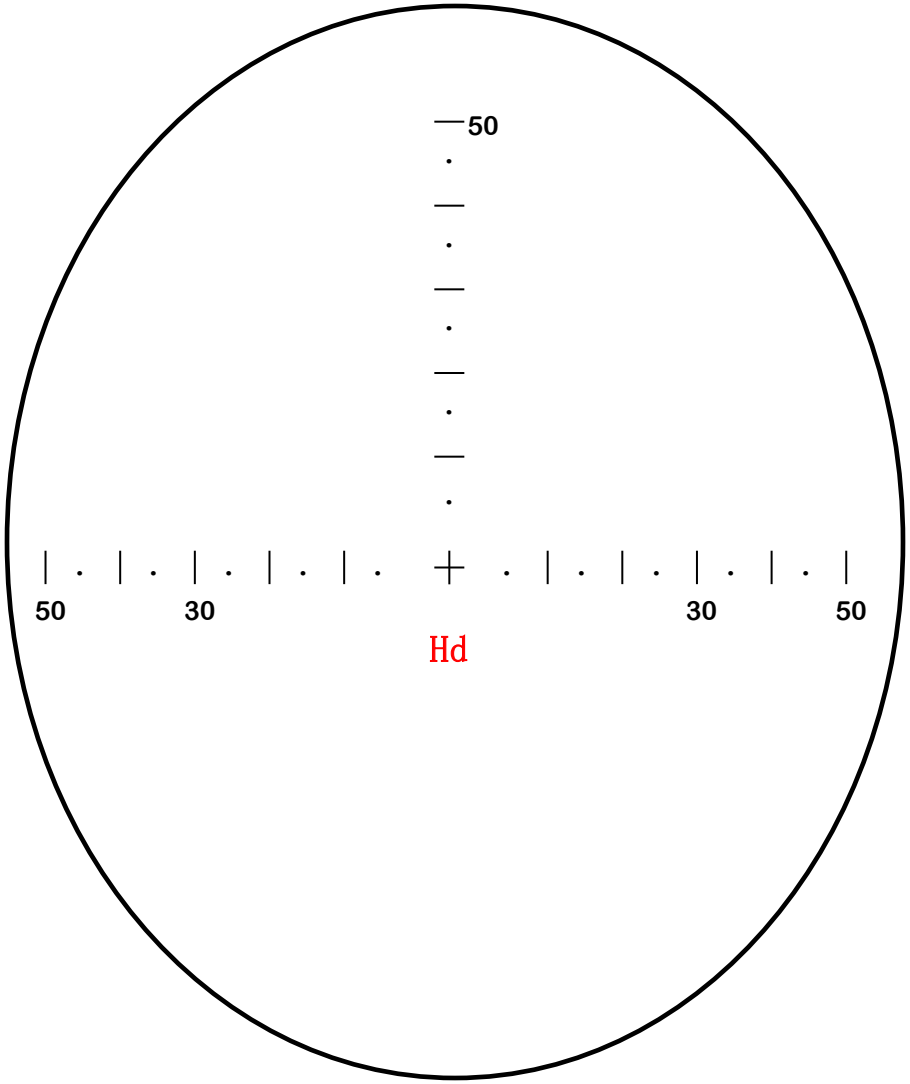
Azimuth Calibration Check

- Procedure for checking local environment for magnetic influence is not referenced however it is as follows:
  - Select object less than 1000 meters in the distance. Perform azimuth measurement while standing. Then kneel down and perform same azimuth measurement.
  - Step one meter to the side and perform same azimuth measurement.
  - Step one meter forward and perform same azimuth measurement.

<u>If azimuth readings lie within +/- 1° or +/- 20mil the calibration can be considered good.</u>

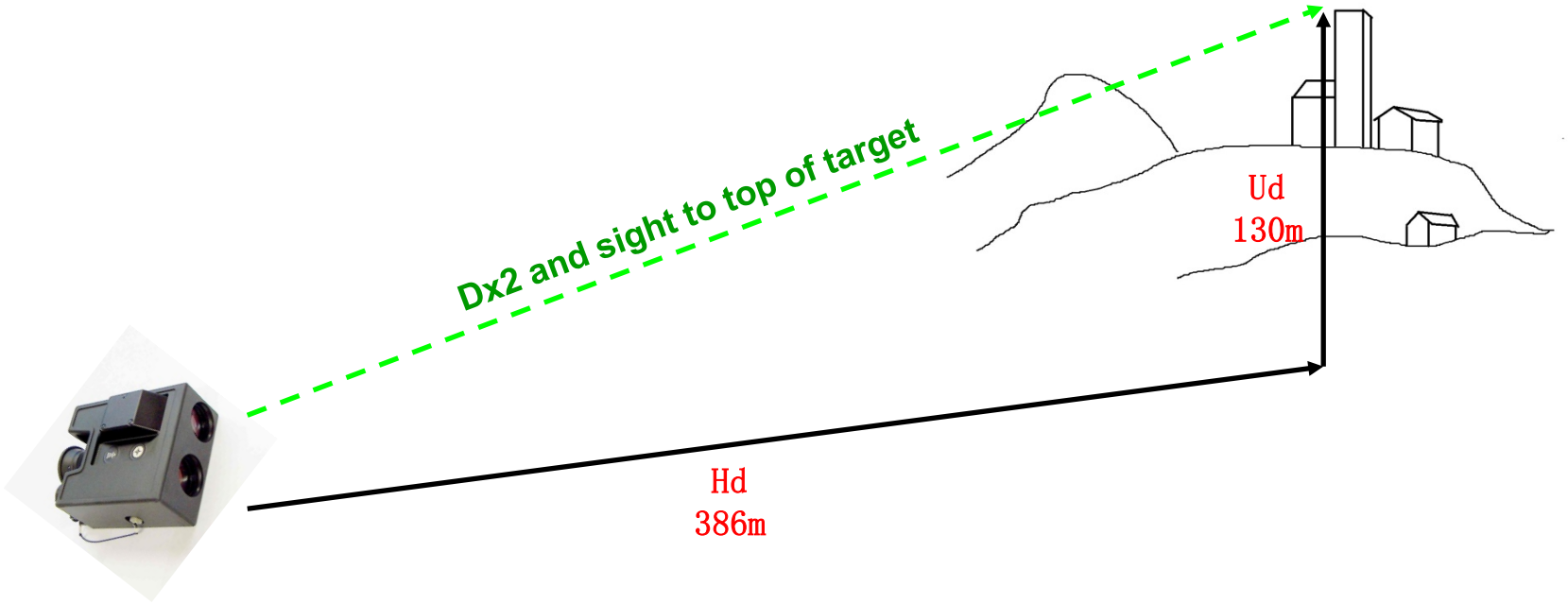
Horizontal & Vertical Distance





- **Press distance key x2 times to get horizontal & vertical distance**

Horizontal & Vertical Distance



- To get the horizontal and vertical distance from your own position, press Distance key twice while sighting the top of the target, then release.
- Hd will appear followed by horizontal distance from your position.
- To obtain upright (vertical) distance from your location, tap the Distance key and Ud will appear followed by the measurement.
- Tap the Distance key to scroll from Hd to Ud and back.

Other Functions – PLRF-15C

Button	Display	Description
Distance x 4	No function	n/a
Distance x 6	**bit**	Performs built-in test
Azimuth x 6	**IF**	RS-170 cable Interface – change from **PLGr** (DAGr) to **PC** with Distance key
Azimuth x 8	**rSt**	Resets to factory defaults: **ErOff** / **GAtE Off** / **NtOff** / **3dOff** / **Unit** – **meters**, **360** degrees / **IF** - **PC**

Cheat Sheet – PLRF-15C

- **This cheat sheet can be printed and attached to the outside of the PLRF-15C for quick reference and ease of operation.**

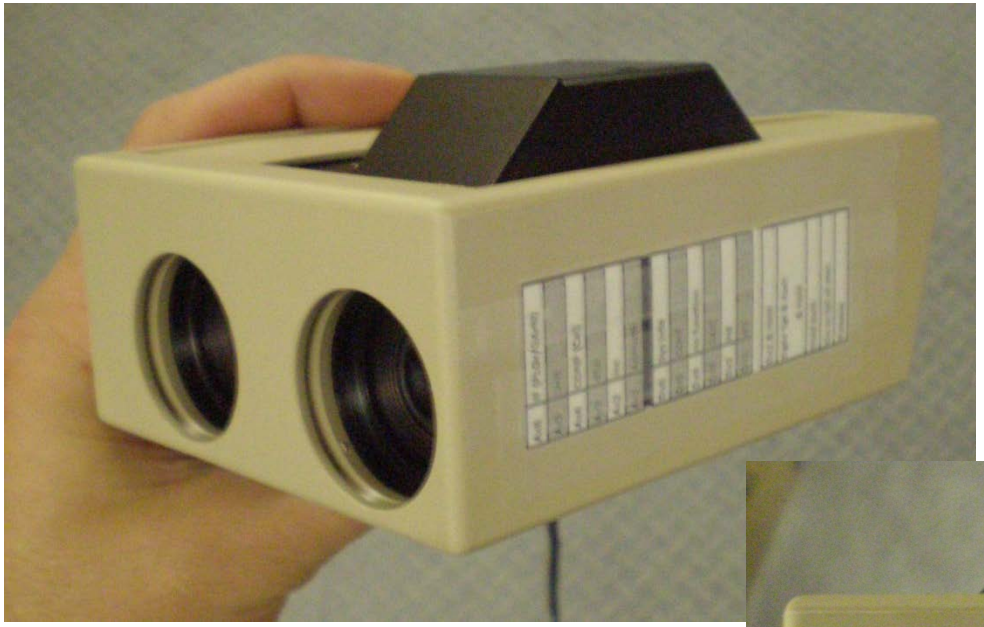
- **Each line shows how many times and which key (A = Azimuth key, D = Distance key) should be pushed for each operation.**

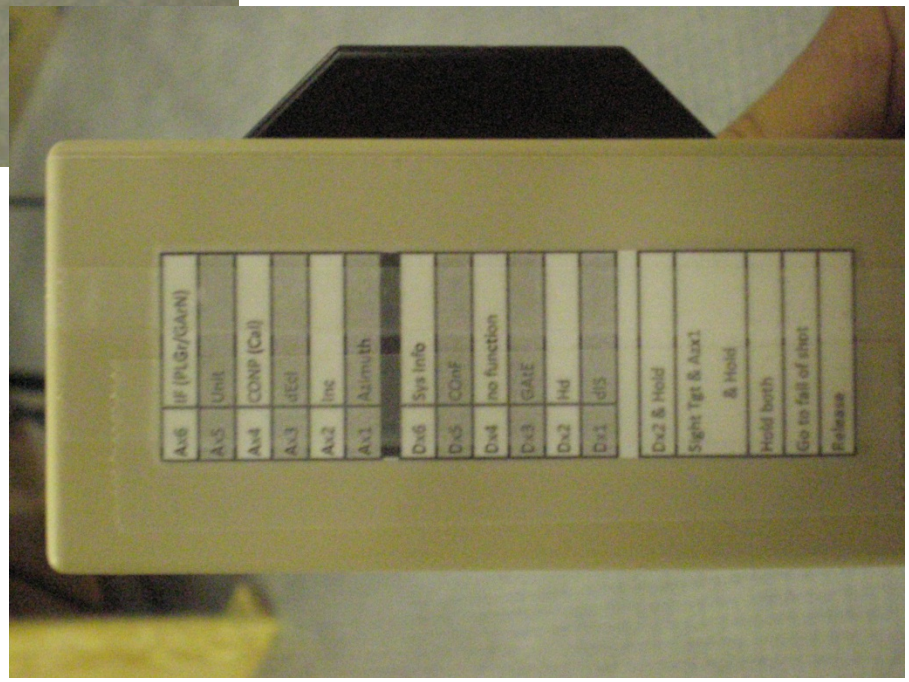
- **The bottom section describes the “Fall of Shot” program.**

Ax6	IF (PLGr/GArN)
Ax5	Unit
Ax4	CONP (Cal)
Ax3	dEcl
Ax2	Inc
Ax1	Azimuth
Dx6	bit / Sys Info
Dx5	COnF
Dx4	no function
Dx3	GAtE
Dx2	Hd
Dx1	dIS

Dx2 & Hold
Sight Tgt & Azx1
& Hold
Hold both
Go to fall of shot
Release

Cheat Sheet – PLRF-15C

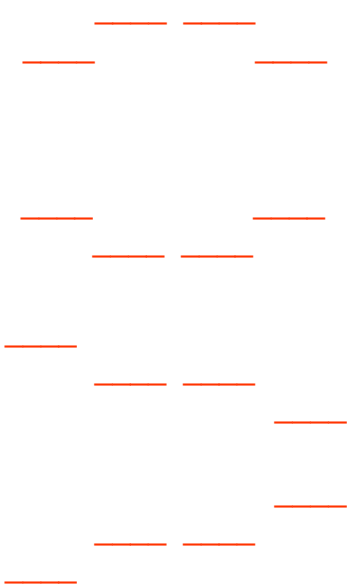




Troubleshooting

FoV	Possible Cause	Solution
No display	No batteries in place Batteries have run out Battery contacts are corroded Device is broken	Insert batteries Change batteries Clean battery contacts Contact customer service
LobA	Batteries are almost empty	Change batteries
– – – –	Distance is outside specified range	New determined constants are stored
6Ate	Measured distance is below selected distance gate	Reduce or turn off distance gate

Troubleshooting

FoV	Possible Cause	Solution
ntOn	Device is used during daylight while ntOn is selected in the configuration menu (dimmed display	Select ntOF in the configuration menu
	Tilted too far up	Turn down
	Tilted too far down	Turn up
	Tilted too far to the right	Turn left
	Tilted too far to the left	Turn right

Troubleshooting – Most Common Problems

Problem	Possible Cause	Solution
Inaccurate Azimuth values	Incorrect declination setting Disruptive magnetic fields at measuring position Bad compensation constants Altered magnetic conditions within the device (battery change)	Set correct declination Check min distance Do “Azimuth check” Perform “Compass Compensation” Perform “Compass Compensation
The electronic reticle (red box) is not visible	**ErOF** is set in the configuration menu	Select **ErOn** in the configuration menu

PLRF-15C Laser Warning

- **PLRF-15C HAS AN INCORPORATED CLASS 1 “EYE SAFE” LASER.**
- **ALL LASERS SHOULD BE TREATED AS A WEAPON - NO MATTER THEIR CLASSIFICATIONS.**

Think before you actuate!!!!

PLRF-15C MAINTENANCE, CARE AND CLEANING

- ENSURE WHEN YOU STORE THE PLRF-15C, YOU REMOVE THE CR-123A BATTERIES.
- AFTER EACH OPERATION, TAKE A SOFT PENCIL ERASER AND RUB ON TO THE BATTERY CONTACTS TO CLEAN THE CONTACTS.
- WHEN STARTING A NEW OPERATION ENSURE YOU USE NEW BATTERIES.
- YOUR PLRF-15C IS WEATHER-PROOFED. DO NOT SUBMERGE IT IN WATER OR ANY OTHER LIQUID.
- AFTER EACH OPERATION, TAKE A CLEAN DAMP CLOTH TO WIPE DOWN THE OUTER CASING.
- ALWAYS (NEVER USE ANYTHING ELSE BUT) USE LENS CLEANING PAPER TO CLEAN THE EYE PIECE AND OBJECTIVE LENS.
- RUB YOUR EYE CUP DOWN WITH SILICON OR VASELINE JELLY, WIPING IT CLEAN AFTER IT CONDITIONS.

PLRF-15C Equipment Repairs

- IF ANY ITEM IN YOUR KIT BECOMES INOPERABLE, PLEASE CONTACT THE FOLLOWING BY E-MAIL OR PHONE:

- ***SSC Pacific C4I Help Desk - 24/7/365***
  ssc_pac_c4isrhd@navy.mil
  (619/DSN) 524-3888

- IF ANY ITEM IN YOUR KIT BREAKS OR BECOMES DAMAGED (FOR ANY REASON), CONTACT THE ABOVE WEB ADDRESS TO CONFIRM SHIPPING INSTRUCTIONS. PLEASE BOX BROKEN OR DAMAGED GEAR AND SHIP TO:

- ***N69255 Receiving Officer***
  Attn: Ron Brown Tel:(619) 524-3882
  SPAWAR Systems Center Pacific (41420)
  4297 Pacific Highway, Building 7
  San Diego, CA. 92110

- ONCE CONFIRMATION OF SHIPPING OF DAMAGED EQUIPMENT TAKES PLACE, REPLACEMENT GEAR WILL BE SENT TO YOU. ENSURE YOU PUT YOUR UNIT'S RUC OR DODAAC NUMBERS AND UNIT'S ADDRESS AND A POINT OF CONTACT WITH EMAIL AND PHONE NUMBER.

QUESTIONS?